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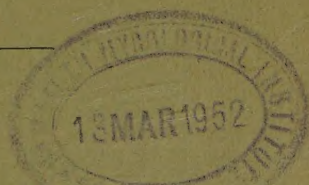
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THE ABSTRACTING ORGANIZATION AS AN INFORMATION SERVICE*

by

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It is hardly possible to speak on this subject without drawing on the actual experience of an existing abstracting organization ; fortunately, the history of the Bureau of Hygiene and Tropical Diseases has now extended for more than 40 years, and it is on that experience that my remarks are based.

In the early years of the present century there occurred in the countries round Lake Victoria, and in some of the islands of that African lake, an epidemic of trypanosomiasis of such extent and gravity that the governments of the countries concerned were compelled to adopt drastic measures to control it. This protracted epidemic revealed how comparatively ignorant of the disease the medical and veterinary departments were, and how badly needed was fundamental research. The governments therefore encouraged research in the field and in laboratories at home. But, as is usual in science, the problems raised excited the interest of research workers in many fields, who reported the results of this work in a wide variety of journals in many countries and languages. The governments therefore also recognized the need for some organization which should collect the available information, and distribute it to research workers throughout the world. To this end an international conference was held, but agreement on how to spread the information could not be reached. The British Government, however, was reluctant to let the suggestion die, and therefore created the Sleeping Sickness Bureau, one of whose functions was to publish the *Sleeping Sickness Bureau Bulletin*. This it did from 1908 onwards. The *Bulletin* contained summary articles, abstracts of published papers, and reviews of books, relating to trypanosomiasis, and a section giving news of fresh epidemic outbreaks, local measures of prevention, new records of the presence of *Glossina*, and other information about sleeping sickness of importance to medical men and administrators in the countries concerned. It was obviously a success, so much so that in 1911 the idea was extended to a similar *Kala Azar Bulletin*, and in 1912 to a publication which should absorb the other two and deal with all the diseases conventionally known as tropical diseases. The first issue of this *Tropical Diseases Bulletin*,

* A paper read at the meeting of the Co-ordinating Committee on Abstracting and Indexing in the Medical and Biological Sciences, Unesco ; Paris, June 1949. Slightly modified from the original published in the Report of that Committee (*Unesco Publication* 580, 1951).

therefore, was published in November 1912; it has continued to appear each month up to the present time, and is now in its 49th volume (1952). At about the same time a request came from South Africa for a similar abstracting journal dealing with veterinary matters, and the Bureau published the *Tropical Veterinary Bulletin* from 1912 to 1930, when the newly founded Imperial Bureau of Animal Health took over this part of the Bureau's work. Besides abstracts grouped according to subjects, the *Tropical Diseases Bulletin* from time to time contains special articles or critical reviews in which advances in knowledge are summed up in convenient form, by experts in the subjects concerned.

The organization continued to develop in response to requests for further extensions of its scope. In the early days papers on tropical sanitation were noticed, and soon whole issues of the *Tropical Diseases Bulletin* were devoted to this subject. In 1921 a separate *Sanitation Supplement* to the *Tropical Diseases Bulletin* was issued, and in 1926 this was expanded to a full and separate monthly publication, the *Bulletin of Hygiene*. This *Bulletin* contains abstracts and reviews, and special articles, on public health, the social services, infective diseases, industrial diseases, sanitation, water, food hygiene, and bacteriology. It is now in its 27th volume (1952).

In 1938, when war with Germany seemed near, the Bureau of Hygiene and Tropical Diseases proposed that in the event of war a bulletin dealing with war medicine should be published. The suggestion was accepted by the Medical Research Council and by the Armed Forces, and in 1940 there appeared the first number of the *Bulletin of War Medicine*, produced and edited jointly by the Bureau and the Medical Research Council. This was modelled on the *Bulletin of Hygiene*; it continued to appear for 6 years and it fulfilled its important purpose of conveying information, abstracted from medical journals of many countries, to members of the Allied Forces and others who needed it in a time of great emergency.

In addition to these publications, the Bureau of Hygiene and Tropical Diseases has produced since 1931 the series of *Supplements* to the *Tropical Diseases Bulletin* which contain synopses of the annual reports of the medical departments of the British Colonies, and the first of a projected series of *Review Monographs*—in this case on Trypanosomiasis and Tsetse Flies.

From January 1951, the sections of the *Bulletin of Hygiene* which deal with Occupational Hygiene and Toxicology, Physiology, and the Hygiene of Buildings, have been reprinted separately each month as *Bulletin of Hygiene Reprints*. Arrangements have also been made with the firm of Sir Isaac Pitman & Sons Ltd., for the issue, in two volumes, of all the abstracts on pneumoconiosis and related subjects which have appeared in the *Bulletin of Hygiene* since its inception in 1926. These abstracts will be arranged in logical order and the volumes will be fully indexed. It is hoped that they will be published before the end of 1952.

Certain other services afforded by the Bureau will bear mention. From 1943 onwards there has been active collaboration with the Commonwealth Mycological Institute for the production of the annual *Annotated Bibliography of Medical Mycology* (now known as the *Review of Medical and Veterinary Mycology*). For many years the Bureau has supplied the titles of all papers chosen for abstracting in the field of industrial hygiene, to the Director of the Department for Research in Industrial Medicine of the Medical Research Council, who is thus given early information of current work in his subject. The same is true (but more recently) of another Medical Research Council Unit whose field of research bears on subjects within the scope of the Bureau. Again, for many years all the abstracts on leprosy published in the *Tropical Diseases Bulletin* have been collected and reprinted in a separate booklet twice each

year for the benefit of the British Empire Leprosy Relief Association. During the past 13 years a series of annual summaries of the work reported in the *Tropical Diseases Bulletin* of the previous year, on each of 9 principal groups of tropical diseases, has been prepared, and these reviews have been published *seriatim* in the *Tropical Diseases Bulletin*. For some years they have been translated into French by the staff of the journal *Médecine Tropicale* (Marseilles), and, with our consent, have been printed in that journal.

Finally, abstracts from our *Bulletins* are often reprinted, by agreement and with acknowledgments, in other abstracting journals—for instance *Public Health Engineering Abstracts* (U.S.A.), the *Journal of Industrial Hygiene and Toxicology* [now *A.M.A. Archives of Industrial Hygiene and Occupational Medicine*] (U.S.A.), the *Veterinary Bulletin* (Great Britain) and others. We are very glad that this practice continues, and we occasionally adopt it ourselves when we borrow an abstract from the *Review of Applied Entomology* or the *Journal of the American Medical Association*. But we do this with discretion because we know very well that the abstracts written for other journals are intended for their own readers and that they may not always stress just those points needed for our readers. Rather than borrow the abstracts, therefore, we tend to borrow the original papers and have them summarized ourselves.

Throughout the years of its existence, the Bureau has also served as a source of information to the multitude of private persons who ask for it either in person or by letter.

In the Bureau the editors of the *Bulletins* themselves look through the large number of medical journals received, and choose the papers suitable for abstracting. The titles of these papers are sent to the appropriate abstracters, and the abstracts, when received, are edited for accuracy by comparison with the originals, for suitability and style, and for uniformity of conventions. They are then grouped according to subjects, and printed.

The reason why I have related this brief outline of the history of the Bureau, which is one of the oldest medical abstracting services in the world, is that it leads to the points I wish to make. As follows :—

1. An abstracting service should have a clear idea of the needs of the readers of its publications. The Bureau was created to answer a specific need, and each addition to its work has been made as a result of the realization of a need. The Bureau has therefore restricted its activities to certain branches of medicine, but within those fields it has attempted to record the important work published throughout the world. The Bureau has never claimed, or desired, to abstract or record every paper written on its subjects ; it has always been selective and has deliberately declined to review papers of doubtful value. Moreover, the Bureau has attempted to provide the kind of abstracts its readers need, realizing that many of them can hardly hope to consult the original papers.

2. Abstracts should faithfully reflect the sense of the original papers, and should be correct in detail. The selection of points for mention in an abstract is, in our opinion, most efficiently done by an abstracter who is himself versed in the work reported, and the Bureau has always obtained the services of men and women of high scientific attainments for this work. Critical comments on the work recorded, when made by such abstracters, are often of the greatest value, and are encouraged by the Bureau. It has been our experience that abstracters rarely make comments or criticisms unless these are obviously justified, and that the criticisms are not trivial. Abstracters of high scientific standing are well aware of the dangers inherent in criticism, especially the danger of over-stressing a debatable opinion, and they are generally scrupulous

to give an author his due. The readers, of course, are usually competent to assess the merits of criticism, and glad of the opportunity to do so.

3. Abstracts can never be completely up to date, and accuracy rather than promptness should always be a first consideration; but it is also the function of an abstracting service, if it is to have lasting value, to cover its field adequately and continuously. A reader who wishes to inform himself on any subject covered by the abstracting journal should be confident that he will be able to find an account of previous substantial work on that subject in the earlier issues of the journal, and that later work will be abstracted in future issues. This does not mean that an abstracting service should not embark on new subjects, but it does mean that the editor must be alert to sense those subjects which promise fruitful development. Continuity of interest entails continuity of editing. It is the function of the editor to choose the material, and if this is not done with care and attention, the service will suffer.

4. At the Bureau we attempt, in presenting the material, to adopt a style which will create and maintain interest. We deprecate too telegraphic a style, and we do not aim to provide merely a title and a few notes to indicate the contents of the paper. We do not want our abstracts to be merely library tools to be looked up on special occasions, but rather to invite reading because of their own intrinsic interest, as literature to which people will turn for the pleasure of keeping themselves informed, even on subjects not particularly their own.

SUMMARY OF RECENT ABSTRACTS

I. CHOLERA

General : Epidemiology

A note on the report of the World Health Organization Joint Study Group on cholera is published on p. 549. This should be read in full.

A series of maps of cholera have been produced by MAY (p. 888). One shows the world distribution, others the historical routes of the major pandemics, the permanence of cholera, outbreaks in recent years, cholera in India and the recent outbreak in Egypt. Sources of information on which these excellent maps are based are given.

MEHTA (p. 732) discusses cholera in Hyderabad State, concluding that the recorded statistics indicate that the incidence has remained uncontrolled. Spread probably takes place in relation to the two fairs which are held each year.

It is not known how the cholera vibrio persists in inter-epidemic periods, and the suggestion has been made that it may be connected with fish or other aquatic fauna. PANDIT and HORA (p. 1106) bring up certain points of distribution and habits which suggest that the Hilsa fish may be involved. The evidence is remote, and no direct work has been done on the subject, but there is a *prima facie* case for study.

Aetiology

Of 415 strains of *V. cholerae* isolated from 200 patients in Calcutta, 112 were of Inaba, 302 of Ogawa, and 1 of Hikojima type (SEN GUPTA, p. 889).

GALLUT (p. 255) has previously discussed the 13 different antigenic fractions (A to M) of the cholera vibrio. He now reports the observation that the sera of persons inoculated with cholera vaccine sometimes agglutinate strains of *Brucella*, and shows that the cholera vibrio and organisms of the *Brucella*

group possess a common O antigen. This is associated with the C and D antigenic fractions. The C fraction is present in the Inaba form of *V. cholerae*, which is always included in cholera vaccine, and the D fraction often accompanies the C fraction, and some evidence of anti-*Brucella* agglutinins after vaccination is to be expected. Serum prepared against an Ogawa strain, which contained O agglutinins for factors A and B, did not agglutinate any strain of *Brucella*.

Cross-agglutination reactions with sera prepared against Inaba and Ogawa strains of *V. cholerae*, and various intestinal organisms, showed that several of these organisms were agglutinated. FELSENFELD *et al.* (p. 987) carried the study further by cross-agglutination tests against the bacterial antigens, and by absorption with Inaba O-H serum. They conclude that the common antigen of the Enterobacteriaceae and *V. cholerae* is the A antigen of the vibrio, and part of its H antigen, which also occurs in brucellae and salmonellae.

GURKIRPAL SINGH and AHUJA (p. 359) have investigated certain strains, reputedly of *V. cholerae*, which have been claimed to contain the A or the B fraction only, and they conclude that these cannot be accepted as *V. cholerae* because they do not conform to other characteristics of that organism. The authors think that the existence of pure A and B forms is not confirmed, and have failed to find the type-specific B and C antigens in non-cholera vibrios. They recommend that a conservative attitude should be adopted towards the existence of pure A or pure B forms and to the reported discovery of 13 different O factors, until more work has been done.

It has been suggested that the factors D to M, described in relation to *V. cholerae*, are rough and non-specific. To elucidate this matter WAHBA (p. 889) has re-examined strains isolated in Egypt in 1947, using microscopic agglutination tests with monotype-specific sera on living suspensions. He concludes that the antigenic character may possibly be affected by the culture medium employed after the first isolation, and by the method of preservation, and that the antigenic formula is not completely stable. In comment, Taylor remarks that the point at issue is not clarified by this, and that it could best be settled by examination of freshly isolated strains.

Type-specific and group-specific characters of *V. cholerae* were associated by Bruce WHITE with a polysaccharide fraction, but in earlier work they had been related mainly to a nucleoprotein fraction, which may not have been entirely free from polysaccharide. SATO *et al.* (p. 987) have re-investigated the subject by preparing pure protein and polysaccharide fractions from Inaba and Ogawa strains. The protein fractions were type-specific and highly antigenic, but the polysaccharide fractions were entirely non-antigenic, perhaps as a result of the alkali treatment used in extraction. Further work is indicated.

VIOLLE (p. 146) shows that cholera vibrios can be killed and lysed by exposure to supersonic radiation, and describes changes of pH and of electrical charge which take place in lysed suspensions. It seems unlikely that a vaccine prepared in this way would be of any practical value. Cholera vaccines of organisms killed by antibiotics are effective in mice (FELSENFELD *et al.*, p. 258).

The sensitivity of recently isolated strains of *V. cholerae* *in vitro* to 10 antibiotics was studied by FELSENFELD *et al.* (p. 988); wide differences were found, according to the geographical origin of the strains.

Clinical Findings : Treatment : Experimental Work

SENECA and HENDERSON (p. 359) apply the term extra-renal azotaemia to the condition in cholera of high blood urea nitrogen along with continuing renal function. Uraemia does not develop if ischaemia is not prolonged, and recovery is usually rapid and complete.

CHAUDHURI *et al.* (p. 255) show that when chloramphenicol is given to patients with cholera it markedly reduces, within 24 hours, the numbers of vibrios in the stools and eliminates them within 48 hours. It may therefore be useful in treatment if given in the early stages.

In a clinical trial of sulphaguanidine, formo-sulphathiazole and formo-sulphacetamide in cholera, in which all patients, including a control group not given chemotherapy, were treated with the usual saline transfusions, LAHIRI (p. 551) found that chemotherapy was a failure, and that, in fact, mortality was lower in the control group than in the treated groups. He states that chemotherapy cannot be expected to influence the marked dehydration and serious biochemical changes which occur as a result of the profuse vomiting and purging. Once the disease is established, the most important factor is adequate supply of fluid and salt.

COLLIER and WATERHOUSE (p. 254) have studied the inhibitory action of two pteridines and sulphaguanidine on *V. cholerae*, and the antagonism to this action displayed by pteroylglutamic acid, pteronic acid, PABA and peptone. Details should be sought in the original. COLLIER and HALL (p. 890) have continued these studies, examining the toxicity to mice, and the vibriostatic activity, of pteridines and sulphaguanidine. They also tested the value of these compounds in the treatment of mice infected intraperitoneally with *V. cholerae* in mucin suspension. Details of this work should be sought in the original.

BURROWS *et al.* (p. 258) have studied the effect of X-ray irradiation on experimental cholera in guineapigs, in which this infection is usually symptomless and non-fatal. Irradiation of a certain degree leads to invasion of the blood with intestinal organisms, including the cholera vibrio if it is present, and this bacteraemia is part of radiation sickness. At a high dose of X-rays there was reduction in the numbers of vibrios excreted and a rise in copro-antibody, which later declined. With lower dosage, copro-antibody was not inhibited, and intensity of infection was reduced, and there was an over-all therapeutic effect. It is suggested that copro-antibody may play a part in immunity to enteric infection; the factor concerned in bacterial invasion of the tissue after irradiation may be the inhibition of copro-antibody. Irradiation before inoculation of cholera vaccine may produce a sharply reduced agglutinin titre, but the titre is not affected by post-immunization irradiation, though faecal and urinary antibodies may be reduced. The effects of irradiation appear to depend on dosage and the stage at which the exposure is carried out.

Cultivation : Vaccine

After a study of culture media containing basic ingredients (NaCl 5 gm., K_2HPO_4 0.75 gm., $MgSO_4$ 0.1 gm., distilled water 1 litre) and various amino-acids, RANTA and McLEOD (p. 358) found that the best results in the cultivation of *V. cholerae* were given by the addition of tyrosine (0.067 per cent.), glycine (0.051 per cent.), asparagine (0.042 per cent.) and glucose (1.0 per cent.) to the basic medium with a carbon dioxide/sodium bicarbonate buffering system, and by subjecting the culture to continuous aeration. Yields were very good, and the cultures were used for the preparation of vaccines.

SOKHEY *et al.* (p. 256) prepare cholera vaccine from liquid cultures in an acid hydrolysate medium; the Ogawa and Inaba cultures are made separately from selected strains maintained in the freeze-dried form, and are killed by formalin. After sterility tests, phenyl mercuric nitrate is added, and the Ogawa and Inaba fractions are pooled in equal quantities. There is little cross-protection between the two forms. The strains used are highly virulent for mice, and protective power is linked with virulence. The vaccine is assessed, not on bacterial content, but on the results of the mouse-protection test;

it shows more protective power than vaccines of organisms grown on agar, such as are commonly used. The authors describe their technique of assay of protective value by giving to mice graded doses of the vaccine, and challenging with a standard dose of virulent organisms. Tests were made of strains of *V. cholerae* from various sources, and containing the various O antigenic factors, but the results indicated again that protective power is not determined by complexity of antigenic structure, but is related to the virulence of the strain used for the vaccine.

Charles Wilcocks

MALARIA

DE LUCENA, D. T. & COSTA, J. L. Estudo epidemiológico da malária no vale do Baixo São Francisco, como referência inicial à aplicação de DDT inseticida. [**Epidemiology of Malaria in the Valley of the São Francisco and the use of DDT**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1950, Apr. 30, v. 2, No. 2, 119-52, 5 graphs, 1 map and 3 charts on pls. English summary.

This study deals with the valley of the lower São Francisco which flows into the southern Atlantic about latitude 10° south. The region appears to be about 200 km. long and includes a number of towns and villages, close to the river. Malaria has been endemic for many years, but despite difficulties of climate and disease, the population has grown steadily in the past century. In 1946, before undertaking an anti-mosquito DDT-spraying campaign, the National Malaria Service instituted a survey of the region by entomologists and malariologists. Nine species of Anopheline mosquitoes were found, the main breeding places being small narrow valleys opening on to the river, in which pools, seepages and small streams occurred.

Inside houses, the following mosquitoes were taken: *Anopheles darlingi* (85 per cent.), *A. albitarsis* (12 per cent.), also *A. tarsimaculatus* and *A. triannulatus*. Some 12,000 thick blood smears were examined which gave an overall parasite index of 6.54 per cent. At some localities, the index was high (25 and 41 per cent. were recorded) but, generally, the malaria level was moderate. The malaria parasites found were *P. vivax*, 82 per cent., *P. falciparum*, 15 per cent. and *P. malariae*, 3 per cent.

The following recommendation was made for control measures: DDT at 1 to 2 gm./sq.m. to be applied twice a year (February and June) or once a year at 2 to 3 gm./sq.m. in April.

J. R. Busvine

AITKEN, T. H. G. **Recovery of Anopheline Eggs from Natural Habitats, an Aid to Rapid Survey Work.** *Ann. Entom. Soc. of America*. 1948, v. 41, No. 3, 327-9. [Summary taken from *Rev. Applied Entom.* Ser. B. 1951, July, v. 39, Pt. 7, 124-5.]

There are several complexes in the genus *Anopheles* the members of which can be separated only by examination of the eggs. In making surveys where they are likely to occur, the usual practice has been to collect females and keep them until they oviposit. This is troublesome and slow and often results in a far less complete survey than could be made by direct collection of eggs, particularly in areas of scattered population where man-made shelters for house-haunting species are few and adults consequently hard to find. Methods have been devised for stranding eggs on cloth through which the water drains away, but much débris is also retained and separation of the eggs is sometimes difficult. Working in Sardinia in 1946, the author found that it was possible to

detect the eggs floating on the water in the dipper, remove them with a piece of straw, make a tentative identification with a hand lens, and then transfer them to blotting paper soaked in 2 per cent. formalin and store them on the blotting paper in glass vials. The top of the paper was bent over to keep the eggs from contact with the glass. Eggs were found in this way in 442 of 546 dipping stations in which larvae were taken. Four Anophelines (*A. maculipennis* Mg. vars. *labranchiae* Flin. and *melanoon* Hackett, *A. claviger* (Mg.) and *A. algeriensis* Theo.) were identified from the eggs, and only one uncommon species (*A. marteri* Sen. & Prun.) found in other stages was not represented in the egg collections. Incidence as determined largely from eggs was confirmed in more extensive studies in the following year.

INDONESIA, MINISTRY OF HEALTH OF : (Section : Malaria Control). **Illustrated Map of the Anopheline Imagines of Indonesia.** (English translation.) 69 pp., 72 figs. 1949, Dec. Djakarta.

The male and female palps, the wings, hind legs, and other adult features, of more than 70 species, subspecies and varieties of Indonesian anophelines are illustrated by large-scale line drawings in this atlas. There are notes on taxonomic characteristics, relation to malaria and breeding places. The book measures nearly 16 by 11½ inches and the matter is printed on one side of the paper only, running across two pages when the book is open. It is a corrected and supplemented edition of the "*Kaart en determinatietabel der Anophelinen in Ned. Oost Indië*", 1938. Literature after 1948 was not consulted for this edition.

H. S. Leeson

JACKSON, R. B. **A Review of Investigations of the Habits and Pathogenicities of the Common Anophelines of Hong Kong.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 91-101.

This review has been compiled from the Annual Reports of the Malaria Bureau from 1931 to 1937. It contains notes on the climate and topography of Hong Kong and brief summaries of malaria investigations.

The four common anophelines are *A. maculatus*, *A. minimus*, *A. hyrcanus sinensis* and *A. jeyporiensis candidiensis*; *A. fluviatilis*, *A. splendidus* and *A. karwari* have been recorded from Shing Mun Camp and *A. splendidus* from Woo Li Hop.

Figures for the dissections of the female mosquitoes and for the precipitin tests are tabulated. The infection rates showed that during the endemic years 1934 to 1936, *A. minimus* and *A. jeyporiensis* were the important vectors of malaria in the colony. The results of the precipitin tests on material from Woo Li Hop, where the population was settled and the animals and people lived together, showed that the anophelines fed mainly on the animals. But at Shing Mun, where there was a fluctuating population and few animals, the anophelines fed mainly on man, so that *A. maculatus* and *A. hyrcanus* became infected with malaria though the rates were lower than those of *A. minimus* and *A. jeyporiensis*.

Larval filariae of *Wuchereria bancrofti* were seen in the thorax, neck and head of dissected anophelines and a small number of *A. hyrcanus*, *A. minimus* and *A. maculatus* were successfully infected after feeding on an infected patient. *A. jeyporiensis* was not available for this experiment at the time.

H. S. Leeson

BREELAND, S. G. **The Identification of the Early Larval Instars of Three Common Anophelines of Southern Georgia, U.S.A.** *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 224-32, 3 figs. [13 refs.]

ANDUZE, P. J. Notas entomológicas I. Dos variedades nuevas de *A. aquasalis*. [**Entomological Notes I. Two New Varieties of *Anopheles aquasalis***] *Bol. Méd. Creole Petrol. Corp.* Caracas. 1948, v. 1, No. 1, 17-19. [Summary taken from *Rev. Applied Entom.* Ser. B. 1951, July, v. 39, Pt. 7, 116.]

This is the first of an intended series of notes on insects that occur in and near the oilfields of the Creole Petroleum Corporation in Venezuela. In it, the author gives characters of the adults, mainly the coloration of the legs, distinguishing two melanic varieties of *Anopheles aquasalis* Curry taken at Pedernales, on the north-east coast, from the typical form and from each other. The names var. *guaraúno*, n., and var. *delta*, n., are proposed for them. Eggs obtained from females of both varieties did not differ from those of the typical *aquasalis*. He also lists three other American species of *Anopheles* that are known to have melanic forms and records *A. bellator* D. & K. breeding in bromeliads, *A. homunculus* Komp. and *Wyeomyia trinidadensis* Theo. from Venezuela.

CORRÉA, R. R. & LIMA, F. de O. Antropofilia do *Anopheles albitarsis domesticus*, do *Anopheles darlingi* e do *Culex fatigans*. [**Anthropophilism in *A. albitarsis*, *A. darlingi* and *Culex fatigans***] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1950, Dec., v. 15, No. 46, 227-32. English summary.

JASWANT SINGH. **Technique of making Blood Smears and their staining in Diagnosis of Malaria.** *Indian J. Malariology.* 1950, Sept., v. 4, No. 3, 349-59. [51 refs.]

Malaria may be diagnosed by studying fresh blood preparations, by concentrating the parasites in centrifugalized defibrinated blood, and by staining blood smears. The great advantage possessed by thick as compared with thin films is stressed, though it is acknowledged that it takes a little practice to become used to the "inelegant" appearance of parasites in thick films. Thin films are still necessary for confirming the diagnosis of species of parasite when unusual forms are present. Useful hints on the preparation and staining of blood films are given. In places where the atmospheric humidity is high, it may be advantageous to blow hot air over thick films in order to accelerate drying. When both thick and thin films are on a single slide, the latter should be fixed by rapid immersion in methyl alcohol, so that the vapour from the alcohol does not also fix the thick film. The alcohol should be kept in a tightly stoppered bottle.

Further details are given about the use of J.S.B. stain which has the great advantage over all other stains in the rapidity with which thick and thin films on a single slide can be stained. The technique may be modified for thin films by dipping the slide first in Solution II (eosin) and after washing, into Solution I. J.S.B. stain not only reveals stippling of the erythrocyte with parasites such as *P. berghei* and *P. knowlesi*, but reveals the diagnostic characters of trypanosomes, relapsing fever spirochaetes, *Hepatozoon*, *Haemoproteus* and microfilariae.

The paper concludes with brief hints on thick-film diagnosis of human malaria parasites.

P. C. C. Garnham

BERGERET, C. Note sur l'interêt de la recherche des hématozoaires dans la moelle osseuse. [**Value of Searching the Bone Marrow for Malaria Parasites**] *Bull. Méd. de l'Afrique Occidentale Française*. 1951, v. 8, No. 1, 19-24.

"Clinical malaria" remains one of the most irritating problems in the tropics, and in French West Africa as elsewhere in Africa, the same conflict of outlook on it exists between the doctor working in a hospital and the doctor who has to visit his patients often far removed from laboratory facilities. With the former, the taking of a thick drop is practically a "reflex action", with the latter the following formula is substituted: disappearance of symptoms after quinine or other anti-malarial=malaria. Sometimes the fatal error is made in urgent cases of taking a sample of blood *after* instead of *before* starting treatment. On the other hand, one must be on guard against "sending a patient to the tomb because of a negative blood slide". The relation between density of the infection and gravity of symptoms is discussed, and the significance of the negative film.

Bone marrow smears were examined of 6 infants with symptoms of malaria but whose peripheral blood showed no parasites—all 6 were positive in the marrow. Films of marrow and blood from 44 children were sent to Dr. Linhard of the Pasteur Institute—29 marrow smears exhibited malaria parasites while 12 of these positive cases were negative in the peripheral blood; only once was the blood positive and the marrow negative. Twenty of the 29 positive marrow smears showed "exo-erythrocytic" forms, *i.e.*, parasites lying outside erythrocytes. [It is not clear from the text what significance the author attaches to these forms.]

P. C. C. Garnham

KÖLLING, H. L. Malaria und Lymphogranulomatose. [**Malaria and Lymphogranulomatosis**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 168-73. [39 refs.]

The English summary appended to the paper is as follows:—

"A malarial infection unknown to the patient became manifest in connexion with the irradiations of lymphogranulomatosis cervical glands and caused relapses. The relations between both these diseases are discussed. The genesis mechanism of a malarial attack after X-ray irradiations is supposed to be in toxically reacting albumen decay products of X-rayed lymphogranulomatosis tissue which destroy cells of the reticulo-endothelium of the liver parenchyma and thus make the parasites flow into the blood."

BONNIN, H. Ce qu'il faut penser de la quinine. [**Observations on Quinine**] *Rev. Paludisme et Méd. Trop.* 1951, July-Aug.-Sept. & Oct. 15, v. 9, Nos. 86, 87, 88 & 89, 185-205; 219-35. [105 refs.]

A general review and discussion.

MACDONALD, O. J. S. & RAO, P. V. **Trials of Proguanil Hydrochloride on Ceylon Estates.** *Ceylon J. Med. Sci.* (Sect. D.) 1950, June, v. 7, Pt. 2, 55-61.

During the period July 1947 to August 1949, 66 malaria patients living on a tea estate in Ceylon were treated with a single dose of proguanil hydrochloride, those aged 15 years and over receiving 300 mgm. of the drug and those aged 2 to 14 years 200 mgm. Twenty-six of the infections were with *Plasmodium falciparum*, 26 *P. vivax*, 6 both *P. falciparum* and *P. vivax* and 8 *P. malariae*. Two other cases, one of *P. vivax*, the other *P. malariae*, were excluded from

the series because a single dose failed to control the pyrexia. All cases were followed up till March 1950. Most of the patients had some premunity, 79 per cent. showing enlargement of the spleen on admission to hospital for the initial attack.

Sixty-three of the 66 patients treated with a single dose of proguanil were free of pyrexia within 72 hours, while 89 per cent. of the blood films were negative for asexual parasites. The readmission rate was, however, 44 per cent. Since the present high standard of malaria control in Ceylon renders the chance of reinfection small, the authors consider that treatment should aim at radical cure of the disease. For this purpose single-dose therapy is not recommended.

A group of 40 children aged 2 to 10 years living on another estate were given weekly doses of proguanil hydrochloride (50 mgm.) over a period of 14 weeks, a similar group receiving no drug being kept under observation for comparison. At the end of the period the spleen rate in the treated group had dropped to less than half, while in those cases where the organ was still palpable it did not project beyond the costal margin. No such reduction in spleen rate and size of spleen was observed in the untreated group.

G. Covell

ARCHIBALD, H. M. **Preliminary Field Trials on a New Schizonticide.** *Brit. Med. J.* 1951, Oct. 6, 821-3.

Preliminary field trials of a new antimalarial drug "B.W.50-63" (2 : 4-diamino 5-*p*-chlorophenyl 6-ethyl pyrimidine) were carried out on indigenous schoolchildren resident in Lagos, Nigeria. [The pharmacopoeial name of the drug tested is pyrimethamine, and the trade name Daraprim.] FALCO *et al.* have shown that many of the 2 : 4-diamino-pyrimidines exhibit high activity against *Plasmodium gallinaceum* in chicks and *P. berghei* in mice, and also against blood schizonts of *P. cynomolgi* in monkeys. The toxicity of pyrimethamine for mice was shown to be remarkably low [this *Bulletin*, 1951, v. 48, 872].

Comparative tests were carried out on groups of children whose blood contained malaria parasites, chiefly *P. falciparum*, in large numbers. One group received a single dose of 25 mgm. pyrimethamine, a second a single dose of 300 mgm. proguanil and a third a single dose of 300 mgm. mepacrine. Pyrimethamine had cleared trophozoites of *P. falciparum* from the peripheral circulation by the end of 48 hours, its action being somewhat more rapid than that of proguanil, though less so than that of mepacrine. Gametocytes of *P. falciparum* were apparently unaffected in all groups.

Further tests showed that 5 mgm. pyrimethamine was as effective as many of the larger doses given during these trials ; that this dosage cleared most trophozoites of *P. falciparum* from the peripheral circulation by the fourth day after administration ; and that parasites of *P. malariae*, though still present in the blood for more than 7 days after treatment, eventually disappeared. The effect of a single dose of the drug appeared to persist for one month after administration.

No toxic symptoms were observed in any of the children treated with pyrimethamine.

G. Covell

FAWAZ, G. & HADDAD, F. S. **The Effect of Lapinone (M-2350) on *P. vivax* Infection in Man.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 569-71.

Although a number of naphthoquinones have shown considerable activity against avian plasmodia, their effect in human malaria has been generally disappointing, presumably because they undergo degradation in the human

body. One of them, however, has been shown to have considerable resistance to metabolic deactivation, namely, lapinone (M-2350), which has a hydroxylated C₁₉-side-chain. This drug is not absorbed efficiently from the gut and must therefore be administered parenterally. Two grammes of lapinone were given daily in one dose, by intravenous infusion over a period of about 2 hours, to 10 patients suffering from *vivax* malaria in a hospital at Beirut, Syria, each subject receiving a total of 8 grammes. Fever subsided after 1 day in 7 cases, 2 days in 1 case, 4 days in 1 case and 5 days in 1 case. Asexual parasites were no longer seen in blood films after 1 day in 2 cases, 2 days in 1 case, 3 days in 1 case, 4 days in 4 cases, 5 days in 1 case and 8 days in 1 case. The authors conclude that the drug has definite suppressive activity against human *P. vivax* malaria.

[Though the patients treated were supposedly suffering from primary infections, it is impossible to be sure that this is in fact the case in a country where malaria is endemic. This consideration cannot but detract materially from the value of the observations recorded in this paper.] G. Covell

RUIZ SANCHEZ, F., LEGOFF, I., PAREDES, M. & RIEBELING, Q. B. Rebeca. Dos casos de paludismo tratados con terramicina. Nota Clínica. [Two Cases of Malaria treated with Terramycin] *Medicina*. Mexico. 1951, June 25, v. 31, No. 630, 223-4, 2 figs.

Two patients in Mexico suffering from *P. vivax* and *P. falciparum* malaria respectively, were treated with terramycin.

The first patient received 35 mgm./kgm. daily for 5 days: parasites disappeared from the blood within less than 2 days.

The second patient received the same daily dose for 3 days, but as there was little or no response, this was increased to 70 mgm./kgm. daily and continued for 8 more days. After 4 days, asexual forms of *P. falciparum* disappeared from the blood, but gametocytes persisted for the month during which the patient was under observation.

H. J. O'D. Burke-Gaffney

WATSON, R. B., PAUL, J. H., CHOW, L. P. & P'ENG, R. Y. Field Trial of Chloroquine (SN-7618-5) for Malaria Control in Central Taiwan (Formosa). *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 301-15, 3 charts.

A population of approximately 400 persons, employees of two power stations situated in a highly malarious area of central Formosa, and their families, were treated with chloroquine over a period of 6 months in 1947.

For prophylaxis, single doses of 5 mgm. of the base per kgm. body weight once weekly gave good results in adults, while for infants and children weekly doses as low as 2.5 mgm. base per kgm. proved effective.

One hundred and twenty persons with parasitaemia, 81 of whom showed clinical symptoms, were treated as under:—

Weight in kgm.	First dose	Second dose	Subsequent doses	Total drug
50 or more	0.500	0.250	0.250	2.00 gm.
30 to 49	0.250	0.250	0.125	1.50 "
15 to 29	0.250	0.125	0.125	1.00 "
10 to 14	0.050	0.025	0.025	0.25 "
9 or less	0.025	0.015	0.015	0.10 "

The drug was given in each case at 6-hour intervals.

Clearance of parasites from the peripheral circulation was effected within 24 hours in 38 of the 39 asymptomatic cases. In those with clinical symptoms clearance was less rapid, but in 87 per cent. of cases it was effected within 48 hours.

The authors conclude that for prophylaxis the programme should be based on a dosage of 5 mgm. base per kgm. body weight to persons of all ages at weekly intervals.

For therapeutic use, they recommend a total dosage of 50 mgm. base per kgm. body weight for all age-groups, the initial dose being twice as great as subsequent individual doses.

G. Covell

TRAVIS, B. V. **Effectiveness of Repellents against Several Species of Anopheles Mosquitoes.** *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 197-205.

The results of large numbers of tests of insect repellents, carried out during the war, are here summarized. The insects used in laboratory tests were *Anopheles quadrimaculatus*, *A. maculipennis freeborni*, and *A. punctipennis*. Each repellent was applied to the forearm of a test subject, and the arm exposed to caged mosquitoes. Exposures were made immediately after treatment, and at intervals of 20 to 30 minutes until a bite was received. The length of time from application to first bite was the basis for comparing the substances tested. The more promising materials were also tested against *Anopheles* species in Panama, Trinidad and Africa. Four standard repellents were included in the tests, these being 2-ethyl 1-3 hexanediol (Repellent 6-12), dimethyl phthalate, Indalone, and Mixture 6-2-2 (6 parts dimethyl phthalate, 2 parts each of Repellent 6-12 and Indalone).

Of 4,313 compounds tested against *A. quadrimaculatus*, the 142 most effective are listed, and detailed results are given for the best 30. Only four materials, p-isopropoxybenzaldehyde, alpha-amylcinnamaldehyde, methyl beta-diethylaminocrotonate, and N-amylsuccinimide, were effective for as long as three hours. Of the standard repellents, only dimethyl phthalate and Mixture 6-2-2 could be included among the best repellents. *Anopheles m. freeborni* and *A. punctipennis* were repelled for more than seven hours by 8 out of 49 materials tested and 5 out of 12, respectively. Full details of these are given. Against *A. albimanus* the materials showed repellencies similar to those against *A. quadrimaculatus*, except that Repellent 6-12 was superior to dimethyl phthalate. In cage tests, *A. gambiae* was repelled for less than one hour by dimethyl phthalate, Repellent 6-12, and Indalone. Details are given of field tests in which several materials were found superior to Mixture 6-2-2 against this species. Against *A. aquasalis* the standard repellents gave good protection for 2½ hours and partial protection for more than 8 hours.

A. J. P. Goodchild

SMITH, C. N. & COLE, M. M. **Mosquito Repellents for Application to Clothing.** *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 206-12.

Several thousand compounds were tested for suitability as insect repellents for impregnation of clothing. The qualities sought were effective repellency after several days' wear or several weeks' storage, and absence of irritation to the skin, unpleasant odour, staining of fabrics or toxicity to human beings.

Tests against the salt marsh mosquitoes *Aedes taeniorhynchus* and *Aedes sollicitans* were conducted in the field, and those against *Aedes aegypti* and *Anopheles quadrimaculatus* in the laboratory. A total of 151 chemicals found most effective in ageing tests were subjected to wearing tests. Cotton stockings

were impregnated with an acetone solution of the repellent so as to leave a deposit of either two or three grammes per square foot. The stockings were worn for 8-hour periods and then tested in the field. If less than five bites in five minutes were received through the stocking, the substance was regarded as satisfactory. Mixtures of repellents were tested and also aerosol application as compared with acetone solution. Full details are given of the experimental results.

The most effective repellents against the salt marsh mosquitoes were Indalone, undecylenic acid, methyl N,N diisopropyl adipamate, 2-butyl 2-ethyl, 1,3 propanediol, and N butyl 1,2,3,6 tetrahydrophthalimide. The best repellents of *Aedes aegypti* and *Anopheles quadrimaculatus* were the two last-named substances, and also 2,4 nonanediol, dimethyl phthalate and Repellent 6-12.

Mixtures of the best mosquito repellents with tick, flea and chigger repellents were tested, of which the best against mosquitoes was Mixture 1960 (30 per cent. 2-butyl 2-ethyl 1,3 propanediol, 30 per cent. N-butylacetanilide, 30 per cent. benzyl benzoate and 10 per cent. emulsifier).

Indalone, dimethyl carbate and ethyl beta-phenylhydracrylate, when tested in aerosols, were slightly better than in acetone solution. A. J. P. Goodchild

RUSSELL, P. F. **Some Epidemiological Aspects of Malaria Control with reference to DDT.** *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 257-65. [33 refs.]

In this paper the author summarizes the record of the influence of DDT on malaria transmission and of the preliminary experimental work against mosquitoes which commenced in 1943. He defines clearly the real relation between anopheline control and malaria control as follows:—"The special influence of DDT on the epidemiology of malaria stems from the fact that once applied in a suitable formulation, it will for many months remain an effective destroyer of anopheline mosquitoes. Certain other toxicants, such as benzene hexachloride (BHC), chlordane and dieldrin, have similar action but shorter residual periods."

"Obviously, if a sufficient number of adults of a vector species acquire lethal doses of such toxicants during the period of sporozoite development, then the transmission of malaria in the community will be interrupted. Any measure which destroys infected vectors before they become *infective* will cut off transmission even though it may not measurably reduce the local density of adults or larvae, or even the numbers of vector adults collected inside or outside treated habitations. However, residual sprays tend to reduce the over-all age of a mosquito population, thus limiting ovipositing. This effect and the killing action greatly reduce the incidence of certain species which are closely house-haunting, for example *Anopheles darlingi* and *A. funestus*."

Successful results have been attained on a country-wide basis in the United States, Venezuela, Argentina, Chile and British Guiana, while Bolivia, Brazil, Ecuador, Peru and Colombia have extensive projects in hand. In Central America and the Caribbean malaria is being forced out of many communities. DDT has changed the malaria map of Europe and the Mediterranean islands. In the Near East, Turkey and Israel have had good results but on the whole the epidemiology of malaria has not been modified significantly. In Asia strikingly good results have been attained in Ceylon and certain parts of Bombay State; preliminary trials have been promising in other parts of India, in Afghanistan, Pakistan, Burma, Malaya, Thailand, Viet-nam, Cambodia and Indo-China. In the Philippines residual spraying has been declared to be of doubtful value.

In the Pacific Islands DDT has not been used to any extent since the departure of military forces.

The status of malaria in North and Central Africa has been little changed, but in South Africa and Southern Rhodesia notable results have been recorded. In Madagascar and Mauritius country-wide campaigns are in progress. In some African experiments BHC has seemed more effective than DDT against *A. gambiae*.

The residual sprays have now demonstrated the economic feasibility of nation-wide malaria eradication even where the disease has been most intensely prevalent. It is quite reasonable now to talk of its elimination, as a public health problem, from the world; indeed this is the aim of the World Health Organization [this *Bulletin*, 1950, v. 47, 809].

R. Ford Tredre

TRAPIDO, H. **The Toxicity of DDT to *Anopheles claviger* (Meigen) in Sardinia and on the Italian Mainland.** *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 266-71. [10 refs.]

The extensive use of DDT for several years has produced numerous instances of DDT-resistant races of house-flies and a few cases of DDT-resistant culicine mosquitoes. In Sardinia, an intensive campaign to eradicate mosquitoes, by the use of DDT as a larvicide and as a residual spray in houses, has been in progress for four years. The author decided to investigate, by careful laboratory tests, the possibility of increased resistance of the anopheline larvae. As it was impossible to find enough larvae of the former malaria vector *Anopheles m. labranchiae*, he used larvae of *A. claviger*, whose breeding places had been similarly treated throughout the campaign. Tests of the 48-hour mortality effected by various dilutions of DDT were made by adding larvae to suspensions prepared by mixing 1 ml. of DDT-acetone solution to 250 ml. of water. Experiments conducted with *A. claviger* larvae in Sardinia were repeated in Italy with larvae from an untreated focus on the mainland. The results are given in tabular form in comparison with American data for *Anopheles quadrimaculatus* and figures for *Anopheles punctulatus* in New Guinea.

No significant difference in susceptibility was found between the *A. claviger* larvae from Sardinia and from the untreated area on the mainland. Both were considerably more resistant than the *A. quadrimaculatus*. [The author estimates a 20-fold difference, apparently on the concentrations for 95-100 per cent. kill; but the more reliable LD50 estimates based on his data are .015 and .0015 p.p.m. respectively, or a 10-fold difference.]

J. R. Busvine

ALVES, W. **Preliminary Note on a Southern Rhodesian Experiment in Malaria Control.** Reprinted from *South African J. of Sci.* 1951, May, 289-92.

Malaria in Southern Rhodesia is a seasonal disease except for some sparsely settled areas of low altitude where anopheline breeding goes on throughout the year because of the prevailing high temperatures. However, certain districts of the seasonal zones were notorious for malignant malaria and blackwater fever and included some of the best farming land in the country. Now 1,900 square miles of this malarious country, defined geographically as the Mazoe River catchment area, has been practically cleared of malaria by the residual insecticide technique of two sprayings at three-month intervals in the malaria season. Details of expenditure are quoted and include "the cost for B.H.C. of spraying 33,000 huts and 3,000 European rooms is approximately 10d. per hut or room" for the year 1950. The residual killing effect of BHC on *A. gambiae* and *A. funestus* lasts for at least 13 weeks with a dosage of 46 mgm. per square foot of the gamma isomer or 370 mgm. per square foot of the water dispersible powder in a suspension of 1 lb. of powder to 3½ gallons of water.

Schistosomiasis is the other important endemic disease in S. Rhodesia, the control of which includes snail destruction. The teams now working in the above area therefore serve a dual purpose, mid-April to mid-September on schistosomiasis control and September to April on malaria control. Details are given of staff, equipment, methods and results of the malaria control activities.

R. Ford Tredre

DOWNES, W. G., BORDAS, E. & CORREA COLORADO, M. **Malaria Control in the Southern Territory of Lower California.** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 286-9.

Prompt and dramatic control of malaria in towns of this semi-desert region has been achieved by DDT residual spraying (2 gm. DDT per square metre) of houses ; but control of anopheline breeding is far from absolute ; the vector is *A. pseudopunctipennis pseudopunctipennis*. In three years parasite rates have fallen to zero ; spleen rates persist at between 10 and 20 per cent, but the average spleen size is small. [Preliminary survey notes are recorded in this *Bulletin*, 1950, v. 47, 429.]

R. Ford Tredre

MARKOS, B. G. **Distribution and Control of Mosquitoes in Rice Fields in Stanislaus County, California.** *J. National Malaria Soc.* 1951, Sept., v. 10, No. 3, 233-47, 9 figs. [10 refs.]

Rice fields, extensive bodies of shallow, warm water with relatively dense vegetation, are prolific sources of mosquitoes. The problem is complicated by mosquito breeding in associated irrigation channels, drainage ditches, seepages and roadside pools. In the Sacramento and San Joaquin Valleys of California the rice fields are flooded for 90 to 140 days between May and September. In this area, in addition to the possibility of malaria outbreaks, epidemics of St. Louis encephalitis and Western equine encephalomyelitis have occurred. The respective vectors, *Anopheles maculipennis freeborni* and *Culex tarsalis*, breed in rice fields.

This paper records the entomological study of sections of rice fields to determine density of breeding of various mosquitoes, their distribution of larvae over the areas of water surface, and the effect of aerial spraying of insecticides. In graph form are recorded the weekly density of larvae and pupae along the low banks between fields and in the centre of fields. It was found that the centres were as productive as the edges, so that control was only possible from the air. DDT and DDD aqueous emulsions applied at the rate of 0.3 pound per acre gave excellent control for one to two weeks. There were three well defined peaks of density of mosquitoes. Firstly the *Aedes* group, *Aedes dorsalis*, *Aedes nigromaculis*, and *Aedes vexans*, appeared immediately after flooding and then disappeared. Secondly, in late June and early July *C. tarsalis* reached its peak, and thirdly *Anopheles m. freeborni* reached its peak in August and September. It was observed that *Culex* and *Anopheles* larvae made their initial appearance shortly after the rice had emerged and stood erect, the average height of the rice then being between 15 and 18 inches.

R. Ford Tredre

TRINIDAD GOVT. **Annual Report of the Malaria Division, Health Dept., Trinidad & Tobago.** 1950. 57 mimeographed pp., 6 graphs (3 coloured).

There has been no epidemic of malaria in any part of the Colony of Trinidad and Tobago during 1950, and there was an appreciable fall in malaria transmission. Recorded deaths due to malaria were 140, eight less than in 1949 ; there has been a steady fall each year since 1943 when the number was 602.

Spleen rates in schoolchildren had an average similar to that of the previous year (2.3 per cent.) but the concomitant parasite rate fell from 3.1 to 1.5 per cent. The schools are scattered throughout the colony at sites influenced by residual DDT house spraying and by the spraying of bromeliads. The slide diagnostic service examined 6,685 (10,424 in 1949) slides with 4.6 per cent. positive result (9.2 in 1949).

Of general interest in the entomological report is the emphasis on the variability of the anthropophilic index in *A. aquasalis* in any one place, the causes of which are obscure; they are not related to fluctuation in density of population. The study of *A. aquasalis* "proves that the name *aquasalis* covers a multitude of crypto-races or sub-spp., of varying vectorial capacity". The results of routine field investigations, e.g., catches by Shannon dawn traps, larval surveys, are given in detail according to locality.

The breeding of *A. aquasalis* in coastal non-tidal swamps, is controlled by drainage clearance and oiling, until such time as reclamation and permanent drainage can be completed. DDT residual spraying is used only in relation to the airport, principally as an *Aedes* control measure. Bromeliad malaria is limited to certain districts and the breeding of *A. bellator* is effectively controlled by spraying the host plants with copper sulphate solution and by their manual removal. A special staff conducts this work. On the island of Tobago the Rockefeller Foundation continue their co-operation with the Government in the malaria eradication project. By the use of insecticides, permanent drainage works and oiling, malaria has been brought to the low level of no public health importance, but as transmission still occurs and eradication is the objective, concentration of effort is still needed. In 1950 the principal effort was directed at the completion of engineering works to deal with vast production areas of *A. aquasalis* in the swamps of the low-lying south-western part of the island.

An *Aedes aegypti* survey of the entire colony revealed high *Aedes* indices in many districts and no area could be considered free of breeding. In the absence of piped-water supplies, water butts are used, and in such areas the index reaches 50 to 70 per cent. Control was instituted by the use of drops of DDT solution in breeding waters. [For the more detailed abstract of the 1949 Report see this *Bulletin*, 1951, v. 48, 8.]

R. Ford Tredre

RACHOU, R. G. Erradicação de anofelinos transmissores de malária. I. Considerações gerais. [Eradication of Anopheline Malaria Vectors: General Considerations] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, Jan. 15, v. 3, No. 1, 92-100. English summary (5 lines).

This is a general dissertation about measures that have been adopted for the control and eradication of malaria. Special consideration is devoted to the technical, economic, administrative and other conditions that must be satisfied before a programme for the eradication of malaria in any given area can be embarked upon with any prospect of success.

Norman White

DE BUSTAMANTE, F. M., PINTO, O. da S., GUEDES, A. S., XAVIER, S. H. & FREITAS, J. R. Sobre a captura do "Anopheles darlingi" e do "Anopheles albitarsis" nas paredes externas de casas dedetizadas em Engenheiro Dolabela, Minas Gerais. [The Capture of *Anopheles darlingi* and *A. albitarsis* on the Outer Walls of Houses Sprayed with DDT in Minas Gerais] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, Jan. 15, v. 3, No. 1, 122-9, 1 fig. English summary (9 lines).

In 1946 the Brazilian National Malaria Service began operations in the highly malarious district of Minas Gerais, near the river Jequitai, where *A. darlingi* and *A. albitarsis* breed prolifically.

Regular nocturnal inspections (between the hours of 6 and 11 p.m.) were made in groups of houses regularly sprayed with DDT. It was noticed that large numbers of mosquitoes were resting on the outer walls of these houses. A series of captures from April 1949 to March 1950 proved that, outside the houses, *A. darlingi* predominated over *A. albittarsis* (6.6 and 2.2, respectively, caught per hour); whereas inside the houses the reverse was true (0.18 and 0.7 per hour, respectively). The very low numbers of *darlingi* inside the houses is noteworthy, for this is a very domestic mosquito; more so than *albittarsis* in fact. In another group of houses, which had not been sprayed for 8 to 12 months previously, the effect of the DDT was still sufficient to keep the numbers of mosquitoes inside the houses lower than outside; but in this case, *darlingi* predominated in both situations. This may be partly due to the fact that *darlingi* predominates in the district; for an analysis of all catches (larvae as well as adults) gave: *darlingi* 43 per cent., *albittarsis* 26 per cent., other species 31 per cent.

Between January and March 1950, the catches at the first group of houses were analysed according to whether they had fed or not, thus:—

	<i>darlingi</i>	<i>albittarsis</i>
Inside houses	9 (33 per cent. fed)	41 (76 per cent. fed)
Outside houses... ..	221 (24 per cent. fed)	85 (47 per cent. fed)

Since *darlingi* normally feeds in human habitations, these data suggest that DDT treatment deterred them from feeding more than it did *albittarsis*.

J. R. Busvine

FERREIRA, M. O., RACHOU, R. G. & LIMA, M. M. Considerações sobre o combate ao "Anopheles (*Kerteszia*) *cruzei*" em Caldas da Imperatriz (S. Catarina) pelo desmatamento; abrigos naturais dessa espécie. [Control of *Anopheles* (*Kerteszia*) *cruzei* in Caldas da Imperatriz, Brazil, by Plant Destruction] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1951, Jan. 15, v. 3, No. 1, 14-35, 2 diagrams, 4 graphs & 2 maps. English summary.

This paper records antimalarial work and observations at Caldas da Imperatriz, a curative spa in the state of Santa Catarina, Brazil. There is a large hotel for visitors and a local population of 256 of whom 98 per cent. have suffered from malaria. A blood examination revealed a parasite rate of 13 per cent. in 1943 (44 per cent. *P. malariae*, 38 per cent. *P. vivax* and 12 per cent. *P. falciparum*).

Malaria is transmitted by *Anopheles* (*Kerteszia*) *cruzei*, which breeds in bromeliads and is very domestic. It is highly prevalent in the months of February to April. In February, 1948, an average of no less than 738 specimens per visit were captured in the hotel.

As a control measure, destruction of the bromeliad-bearing trees in the vicinity of the hotel was commenced in 1947 and continued steadily until, in 1950, nearly 7 square kilometres had been cleared. [Compare RACHOU, FERREIRA and LIMA, this *Bulletin*, 1951, v. 48, 618.] The progressive clearance was marked by a great reduction in the numbers of *Kerteszia* mosquitoes found in the hotel at the peak period; the maximum was only 59 in March 1949 and 55 in March 1950. Although the actual numbers were lower, most of the inspections were positive. The prevalence of the mosquitoes was investigated by catches of half-hour duration, in human and animal traps at different points in the cleared area round the hotel. There were 96 catches made at each of 16 stations during the period February to April 1950. It was found

that the mosquitoes entered the traps in a very short time. In a series of 609 catches, the first specimen of *Kerteszia* was caught within 5 minutes in 264 cases (43 per cent.). The authors consider that patches of bushes left in the clearing work (which do not harbour bromeliads, of course) provide resting places for the mosquitoes flying across from the forest. These patches should be eliminated. They also point out that *A. (Kerteszia) cruzii* has a flight range of more than 1 kilometre.

J. R. Busvine

JASWANT SINGH, NAIR, C. P., BASU, P. C. & RAY, A. P. **Therapeutic Action of Paludrine Lactate (Intravenous) in Simian Malaria.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 337-46. [60 refs.]

Tests were carried out to assess the value of intravenous injections of paludrine (proguanil) lactate in the treatment of infections with *Plasmodium knowlesi*, *P. cynomolgi* and *P. inui* in northern Indian monkeys (*Macaca mulatta*).

In *knowlesi* infections, single doses of 7 to 33 mgm. base per kgm. body weight were found effective, the average time for clearance of parasites from the peripheral blood being 169 hours. Relapses were observed in all cases. Sixteen monkeys were used in these experiments.

For the treatment of infections with *P. cynomolgi* and *P. inui*, the only dosage tried was a single injection of 33 mgm. base per kgm. body weight (the maximum tolerated dose), two monkeys being used in each case. The average time for clearance of parasites was 86 hours in *cynomolgi* infections and 156 hours in *inui* infections. Relapses were again observed in all cases treated.

The authors conclude that the action of proguanil in simian malaria, as in human malaria, is definitely slow and are in agreement with the opinion expressed by other observers that it is unsuitable for use in the treatment of acute malaria complicated by cerebral involvement.

G. Covell

DURBIN, C. G. **Attempts to transfer *Plasmodium berghei* Vincke and Lips to Domesticated Animals.** *Proc. Helminthological Soc. of Washington*. 1951, July, v. 18, No. 2, 108-10.

"A group of domestic animals, consisting of 2 lambs, 2 pigs, 1 calf, 2 puppies, 2 kittens and 5 chicks, was inoculated i.v. with blood of white rats heavily parasitized with *P. berghei*. The inoculated animals were observed for clinical symptoms of parasitosis with negative results. Thick and thin blood smears were made and found negative for parasites. Subinoculations were made to check for any inapparent or subpatent infections; all results were negative.

"Since attempts to transfer *Plasmodium berghei* to the animals used in these experiments were unsuccessful, it is reasonable to conclude that the hosts listed were not susceptible to infection with this parasite."

TRYPANOSOMIASIS

COLONIAL OFFICE. **Colonial Research 1950-1951. Tsetse Fly and Trypanosomiasis Committee. Report for 1950-1951** [COHEN, A. B., Chairman] (pp. 207-20). Cmd. 8303. 243 pp. 1951, July. London: H.M. Stationery Office. [6s. 6d.]

The Tsetse Fly and Trypanosomiasis Committee has not previously made a report of this type. The present document is therefore introduced by an account of the events which led up to the appointment of the committee and of

some of its previous activities. Among other things, it has been responsible for reviews of existing knowledge, based both on abstracts of literature and on several tours in Africa. It was active in initiating work on insecticides against tsetse but passed that on to another organization, and it has helped forward some interesting work in the field on the chemotherapy of trypanosomiasis, both in man and in domestic animals. The committee has also been active and successful in developing international co-operation and international meetings. More recently, scientific studies on game have been discussed as a joint project between this committee and a corresponding one dealing with agriculture and animal health.

Turning to the part of the report which deals with 1950-1951, it is no easy matter to present an abstract of a document which is already much condensed. The research and reclamation work in eastern Africa has already been abstracted for this *Bulletin*, 1951, v. 48, 951. We will confine ourselves to observing that there is a close relationship between the work on entomology and on trypanosomiasis; and between research and reclamation; and between medical and veterinary work.

On the veterinary side, it is recorded that Dr. H. E. HORNBY carried out a long journey in the latter part of 1949 in order to make a comparative study of the veterinary problems over a great part of eastern Africa. Arrangements for publication of the report are in hand. In Northern Rhodesia it is held that epidemics of trypanosomiasis in cattle are not due to transmission by tsetse but by numerous other biting insects: [this view we believe to be correct, though it is difficult to prove it]. Under these circumstances, entomological measures seem unlikely to be successful; large-scale use of phenanthridinium appears to have reduced the number of infected animals and controlled the spread through the herds.

The West African Institute for Trypanosomiasis Research reports that, following the appointment of Col. H. W. MULLIGAN as Director, 1947, sites for building and experimental work have been acquired, both at Kaduna, where human and animal trypanosomiasis are endemic, and tsetse are available, and also at Vom, in the plateau, where tsetse are absent, so that the diseases are rare or absent under natural conditions. Rapid progress has been made in erecting laboratories and living quarters, and the Institute has become an independent body, governed by a managing committee containing representatives of the four West African governments. The institute has no direct responsibility for the control of trypanosomiasis (a point of distinction from the arrangement that has been made in East Africa): its function is to carry out research, and to act as a clearing house for information and for training technicians. We note that it is intended to rear tsetse in the laboratory on a very large scale, in order to have clean flies for purposes of research in protozoology: it is not clear whether they are to be reared from pupae collected in the field or by maintaining strains of several species of tsetse permanently in the laboratory. It is refreshing to see that studies are being made on the epidemiology of human sleeping sickness and interesting to see that the serious epidemics of human sleeping sickness which have occurred in Northern Nigeria are apparently to be traced to two relatively restricted endemic foci. From these areas it seems that the epidemics were spread because the conditions of life changed and infected individuals were free to move about. On the veterinary side also, a healthy interest is being taken in the epidemiology of trypanosomiasis, the size of the problem, the conditions where the infection is acquired and the movements of cattle, and so forth.

The committee has been insistent in the matter of testing new drugs very thoroughly on animals, before they are used in the field in Africa, and on the necessity of establishing biological standards of toxicity and so forth. That

interesting compound, melarsen, discovered by FRIEDHEIM, has passed their scrutiny and been produced : it is about to be tested in a thorough manner, in collaboration with the Nigerian Sleeping Sickness Service. *P. A. Buxton*

MORRIS, K. R. S. **The Ecology of Epidemic Sleeping Sickness. I. The Significance of Location.** *Bull. Entom. Res.* 1951, Aug., v. 42, Pt. 2, 427-43, 2 maps (1 coloured). [23 refs.]

The author continues to develop an interesting "ecological" view of human trypanosomiasis in the Gold Coast and surrounding territories. It is based on a wide knowledge of the people, the tsetse and the physical environment.

The author asks himself why human trypanosomiasis in West Africa has sometimes developed into huge epidemics, whereas in East Africa, the outbreaks have been sharp, but limited, and of comparatively brief duration. A partial answer is found in the fact that infections with *Trypanosoma rhodesiense* cause the patient to become extremely ill within ten days of being infected. He cannot therefore go into the bush, and has little contact with *Glossina morsitans*, and he dies in a matter of months without having proved seriously infectious to the tsetse and the human community. On the other hand, the West African sleeping sickness, caused by *T. gambiense*, is prolonged and mild, and the patient does not feel ill, indeed, he may survive for a number of years [a point on which further information should be collected]. The infected man may therefore continue at his normal occupations, farming, travelling, fishing and so forth, and he may live in contact with large numbers of tsetse before his illness keeps him at home. His opportunity of infecting *G. palpalis* or *tachinoides* is therefore perhaps prolonged and widespread. Carrying the same argument a little further, one may compare events in the savannah in the northern part of the Gold Coast and Nigeria, the Ivory Coast, etc. with those in the equatorial forests in the south close to the sea. In the savannah, with its very prolonged dry season, man must confine himself to the neighbourhood of permanent water, so that in his village, or at work, he may be in intimate and regular contact with the waterside tsetse : this may result in high rates of mortality due to sleeping sickness. Even if the people forsake their village, they will probably find another close to a river, in which case a fresh outbreak is to be expected. It is in this way that Morris would explain the great West African epidemics, such as the one in the northern part of the Gold Coast and the contiguous parts of the Ivory Coast. In that area he had an opportunity of studying an epidemic which covered 60,000 square miles and which gave infection rates of 5-15 per cent. over half of that area : one remembers also the enormous epidemics that used to occur in the north of Nigeria. In contrast with this, man may live in contact with *G. palpalis* in equatorial forest, where one may catch the tsetse in the village biting the people, but without any infection with trypanosomes. This, it is suggested, should be explained because there is no small focus where man and fly are compelled to meet and continue to meet. Even if a stranger were to come in infected with the trypanosome, he would, as has been well established, only infect an extremely small proportion of the flies feeding upon him. As those flies can range widely in all directions through the forest, the chance of an infected individual biting another man and transmitting the infection appears to be rare [it being assumed, we think, that the *palpalis* must have hosts other than man].

Much of the epidemiology of sleeping sickness in West Africa may be explained by movements of population. It is reasonable to suppose that the occupation and pacification by European powers, which took place about the beginning

of the present century, made movement and trade safer, and probably led to the dissemination of sleeping sickness in a severe and extensive way. The same principle, that human movement has spread this disease, may be the explanation of some older fragmentary records of sickness, interpreted by Morris with great ingenuity. In more recent years, he shows that there is good ground for believing that trade routes, particularly those used by caravans carrying the valuable kola nut from forest areas in Ashanti to markets further north, have had a large part in the dissemination of sleeping sickness. In this way he would explain the importance of such places as Kintampo and Wenchi, which are kola markets, and round which it seems the disease first appeared on a considerable scale. This interpretation is put forward in a map printed in two colours.

In the savannah countries, the disease has not tended to spread in all directions, because the conditions are unsuitable, but along the lines of rivers, which form long, linear fly belts, the spread is assisted by the movement of the villagers and cultivators. A third type of spread has been limited by a climatic factor: in the north of the Gold Coast, one is close to the northern limit of tsetse, which roughly follows the line of division between the savannah and the semi-desert "thornland". In that territory, there was an outbreak of sleeping sickness about 1885 at a place called Tourcoingbam. The area would not now be regarded as suitable to any species of tsetse, though there are a few trees and bushes of types which may generally be associated with *G. tachinoides*. But it seems that, at the time of the epidemic, the country was more thickly wooded, and that since that date a climatic change and process of desiccation has pushed the northern limit of tsetse some 30 miles further south. Other evidence is produced, perhaps less clear, suggesting that this climatic change is operative and that the northern edge of the tsetse and sleeping sickness area may have moved southwards even more recently. P. A. Buxton

TATE, P. Antagonism of *Spirillum minus* Infection in Rats towards *Trypanosoma lewisi* and *T. equinum*. *Parasitology*. 1951, July, v. 41, Nos. 1/2, 117-27. [23 refs.]

After a review of previous work on the effect of *Spirillum* and spirochaetes on the course of trypanosome infections in laboratory rodents, the author describes his own observations on the mutual relations of *Spirillum minus*, *Trypanosoma lewisi* and *T. equinum* in mixed infections of rats.

In "clean" rats inoculated with *Spirillum* alone, the incubation period is 7-8 days, after which the organisms remain in the peripheral blood for about 10 days; they later disappear but the infection may persist up to 29 weeks, with occasional re-invasion of the blood. A pure *T. lewisi* infection in rats runs a normal course, usually lasting 4 weeks or longer, without any pathological effect on the host. On the other hand, *T. equinum* produces a parasitaemia which is usually fatal within one week after inoculation. To test the effect of *T. equinum* upon rats already harbouring *T. lewisi*, the rats were inoculated with *T. equinum* 2, 4 and 6 weeks after inoculation of *T. lewisi*. The course of the *equinum* infection in these cases was unaffected by the pre-existing *lewisi* infection. The course of infection with *T. equinum* in rats already infected with *Spirillum* depends upon the interval between the inoculations: when the two organisms were introduced simultaneously, the trypanosome infection ran its normal course, killing the rats by the 6th day; but when the trypanosomes were inoculated 2 weeks later, they produced only a mild transient infection with scanty parasites, which soon disappeared from the blood but subsequently

produced relapses which killed the rats. The resistance, due to the presence of *Spirillum*, diminished when trypanosomes were inoculated 4-6 weeks after *Spirillum*, for the infected rats usually died in 7 to 15 days, though some individuals survived longer. The resistance due to *Spirillum* is subsequently replaced by a specific resistance, which protects the rats against reinfection with the homologous species (*T. equinum*) but not against the heterologous one (*T. lewisi*). Other experiments indicated that an existing infection with *T. lewisi* does not protect against *T. equinum*, and that the resistance induced by *Spirillum* is not affected by a co-existing infection with *T. lewisi*. It was also shown that in rats infected with *Spirillum* the resistance is not specific as it is effective against both species of trypanosomes used. When this resistance disappears, it is replaced by a specific resistance to reinfection with the homologous trypanosome, but the rat is susceptible to infection with the heterologous trypanosome.

In discussing these phenomena, the author points out that the nature of the non-specific primary resistance induced by *Spirillum* is unknown, but the specific resistance which follows might be brought about by antigens released by trypanosomes killed in the primary phase. It is further suggested that the *Spirillum* infection has the same effect as subcurative doses of trypanocidal drugs, in that it suppresses the acute phase of the trypanosome infection, which is succeeded by a chronic phase, the specific trypanosome resistance being analogous to premunition. This immunity may later break down, with the result that a relapse is produced.

C. A. Hoare

CULWICK, A. T., FAIRBAIRN, H. & CULWICK, R. E. **The Genetic Relationship of the Polymorphic Trypanosomes and its Practical Implications.** *Ann. Trop. Med. & Parasit.* 1951, May, v. 45, No. 1, 11-29, 10 figs. [12 refs.]

In a previous paper [this *Bulletin*, 1949, v. 46, 812] the authors have given the measurements of typical strains of *Trypanosoma rhodesiense*, *T. gambiense* and *T. brucei*, which remained unchanged after several years, indicating "that the morphological properties of these strains are fixed heritable characters, constant over a large area and over periods of time representing near-eternity in the life-history of a trypanosome". They also referred to two *brucei*-like strains in which the dimensions of the blood forms differed markedly from those of the above-named species. In the present paper a description is given of experiments in which such atypical strains were reproduced by mixing the typical strains *in vivo* and *in vitro*, after which the artificially produced strains were passaged by syringe or cyclically through various animals, and periodical measurements of the trypanosomes were made in all the infections.

In one series of experiments a mixture of *T. rhodesiense* and *T. brucei* was used. These species were united either *in vivo*, by inoculating an animal with both trypanosomes (by syringe or by tsetse flies), or *in vitro*, by mixing two samples of blood containing these trypanosomes. In either case, the mixture resulted in the appearance of a new variant or strain of trypanosomes, the measurements of which differed significantly from those of the original two species and remained constant throughout subsequent animal and fly passages. The measurements of all the strains described in this paper are tabulated (as Appendices) on 4 pages which cannot be summarized here, but the following simplified version of one of the tables gives some idea of the differences between the original species and the strains resulting from their mixture, in two of the tests.

Trypanosome	Mean lengths (μ) of forms					
	Short		Intermediate		Long	
	1	2	1	2	1	2
<i>T. rhodesiense</i>	19.12	18.79	23.28	22.53	29.40	28.76
<i>T. brucei</i>	18.89	19.01	23.73	23.01	29.44	29.79
Mixture	16.89	16.85	21.63	22.46	26.27	27.73

In addition to the morphological alterations, strains derived from mixing *T. rhodesiense* and *T. brucei* underwent changes of virulence, for on a number of occasions they failed to infect human volunteers, when these were inoculated from the animal in which the mixture took place or after passages through a series of animals. However, in some cases inoculation of these strains into man resulted in his infection, but the infectivity for man was usually lost after further animal passages.

Mixtures of *T. gambiense* and *T. brucei*, both *in vitro* and *in vivo*, gave similar results, giving rise to strains which were shorter than the above-named species, the mean lengths (in μ) of the slender trypanosomes in one case being as follows :—

<i>T. gambiense</i>	29.28
<i>T. brucei</i>	28.88
Mixture	27.46

The behaviour of the *gambiense*+*brucei* strains in man was somewhat similar to that of the *rhodesiense*+*brucei* strains. Thus, one strain was divided into three lines, one of which failed to infect 2 men after it had been passaged through rats for about 4 months, but the others retained their virulence and infected one man about 3 weeks after the mixed strain was produced, and two other men after about 2 and 6 months respectively.

Finally, a strain was produced by mixing *T. rhodesiense* and *T. gambiense* : the resulting trypanosomes were shorter than those in the two original species, but the new strain did not lose its infectivity to man or its transmissibility by tsetse.

It is noted that the strains derived from mixing *T. brucei* with *T. rhodesiense* or *T. gambiense* infected man only on those occasions when the human trypanosomes were allowed to establish themselves for some time in the donor-host before it was superinfected with *T. brucei*, but if the mixing was simultaneous or with only a short interval, the trypanosomes became non-infective to man. In discussing the loss of infectivity to man in the mixed strains, the authors argue that it cannot be attributed to *T. brucei* overgrowing and swamping the human trypanosome, for in two instances the mixed strain failed to infect human beings after its sojourn in man, who is known to be refractory to infection with *T. brucei*.

The authors also record the discovery in Tanganyika of three strains isolated from wild *Glossina*, which proved to be structurally identical with the artificial strains produced in *brucei*+*rhodesiense* mixtures ; one of these natural strains was tested for infectivity to man with negative results.

The authors regard the strains, arising in a mixture of *T. brucei* with one or the other of the human trypanosomes, as hybrids produced by the union of the

two constituent species and endowed with new morphological and biological properties (loss of infectivity to man). In support of this view a mathematical analysis of the observed phenomena is adduced. The assumption that hybridization of *T. brucei* and *T. rhodesiense*—with the loss of infectivity to man—may occur under natural conditions, has led the authors to revise their views on the control of Rhodesian sleeping sickness. It is pointed out that, since game animals commonly harbour *T. brucei* and also serve as reservoir hosts of *T. rhodesiense*, they provide conditions under which these two species will mix, thereby destroying the infectivity of *T. rhodesiense* to man. While the previous policy advocated wholesale destruction of wild game in tsetse areas where it is in contact with man, the authors now believe “that we should pause to reconsider the situation, for . . . our work suggests . . . that the wild game, far from being an unequivocal danger to man, may in appropriate circumstances be a potent factor in preventing the spread of sleeping sickness”. In other words, it is suggested that wild game should be preserved, since it affords a means of biological control of sleeping sickness, by rendering *T. rhodesiense* harmless to man.

On the strength of these observations the authors regard *T. brucei*, *T. rhodesiense* and *T. gambiense* “not as three distinct species, but as varieties within the same species”, which should be known under the names *T. brucei* [actually this should be *T. brucei* var. *brucei*], *T. brucei* var. *gambiense* and *T. brucei* var. *rhodesiense*, while for the strains produced by mixing the human and animal variants the name *T. brucei* var. *kabetei* is proposed.

[While there can be no doubt about the practical importance of the findings recorded in this paper, the interpretation of the nature of the phenomena observed is open to criticism. The authors regard the strains produced by mixing *T. brucei* with one or the other human trypanosome as hybrids, but do not consider—as an alternative explanation—the competition or antagonism between two parasites in a mixed infection. In the case of trypanosomes, this may bring about the inhibition or even complete suppression of the development of one of them, allowing the other to be recovered alone: thus *T. congolense* can be inhibited in this way by *T. brucei* (see this *Bulletin*, 1935, v. 32, 713) or by *T. vivax* (Roubaud, 1951). Furthermore, in a mixture of two trypanosomes, or of a trypanosome with some other microorganism, the virulence of a trypanosome may also be affected. Thus, when associated with *T. vivax*, the virulence of *T. brucei* for sheep is considerably enhanced (CURASSON, 1931), whereas in mixed infections with spirochaetes or spirilla, the virulence of pathogenic trypanosomes is reduced (*cf.* TATE, above). It is obvious that in these mixtures of unrelated trypanosomes, and of trypanosomes with spirochaetes or bacteria, the changes undergone by the trypanosomes cannot be attributed to hybridization. In the light of these facts, it is conceivable that in the experiments described in the present paper the properties of the mixed strains may be due to other causes, such as: (1) suppression by *T. brucei* of the virulence of the human trypanosome, manifested in loss of its infectivity to man; or (2) swamping of the human trypanosome by *T. brucei*—possibly accompanied by exaltation of its virulence, thus enabling it to infect man. The last supposition—though somewhat improbable—is not impossible, in view of the successful infection of man by *T. brucei* reported from the Belgian Congo (this *Bulletin*, 1948, v. 45, 503). As regards the morphological changes in the mixed strains, they are negligible and might also be due to environmental conditions. Finally, it may be noted that the change in the nomenclature of the polymorphic trypanosomes proposed in the present paper has already been made by the reviewer 22 years ago and again suggested in subsequent publications.]

C. A. Hoare

MARIENBERG, G. Kälte-Agglutinine bei Trypanosomiasis und Malaria. [Cold Agglutinins in Trypanosomiasis and Malaria] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, June, v. 3, No. 1, 33-41. [32 refs.]

This experimental work was done at the Bernhard-Nocht Institute in Hamburg. The author examined the blood of laboratory animals, infected with *Trypanosoma gambiense* or *T. lewisi*, and the blood of persons infected with *Plasmodium vivax*, to study the behaviour of cold [auto-]agglutinins and their relation to other serological or haematological changes. He used the method of LIPPELT and NOGALSKI (*Klin. Woch.*, 1949, v. 27, 196) in which measured amounts of serum and erythrocytes are mixed in small tubes and kept at 0°-4°C. Cold agglutinins were present in the rabbits, guineapigs and rats used and in the malaria patients, the titres showing great variation. In splenectomized rats the trypanosomes were much increased in number and the titres of cold agglutinins were reduced as compared with controls; no connexion of cold agglutinins with other blood conditions was observed. The author concludes that the reaction has no diagnostic value in sleeping sickness and malaria.

J. F. Corson

SQUIRE, F. A. Seasonal Variation in the Incidence of *Trypanosoma vivax* in *Glossina palpalis* (R.-D.). *Bull. Entom. Res.* 1951, Aug., v. 42, Pt. 2, 371-4, 1 fig.

Previous work in Sierra Leone has shown that the incidence of *Trypanosoma vivax* in the proboscis of *Glossina palpalis* varies from under four to over 16 per cent. even in considerable samples. The figures suggest that the infection may be rarer in the dry season, and reach a maximum in the rains. A similar seasonal incidence of this parasite in *G. morsitans* and *tachinoides* in Northern Nigeria was attributed by JOHNSON and LLOYD to changes in the mean age of the fly population, though the evidence for this was far from conclusive [this *Bulletin*, 1923, v. 20, 794; 1924, v. 21, 760; 1925, v. 22, 290].

The present author, working in Sierra Leone with *G. palpalis*, has previously defined three age-groups, based on the colour of the wing, and the fraying of the hind margin [this *Bulletin*, 1950, v. 47, 527]. In the present paper he gives the results of about 3,200 dissections made during every month of the year, and presents his results for trypanosome infection in the proboscis only, that is to say, *T. vivax*. His results, by age-groups, are as follows:—

Age-group 1.—1,013 flies, 0.5 per cent. infected.

Age-group 2.—1,579 flies, 4.7 per cent. infected.

Age-group 3.— 634 flies, 9.1 per cent. infected.

All ages.— 3,226 flies, 4.3 per cent. infected.

In view of these figures, it is evidently justifiable to eliminate all flies in age-group 1, because they are too young to show an infection of the proboscis, and if breeding is seasonal, as may well be the case, the presence of considerable numbers of these flies at a particular season might well give a misleading impression of the distribution of the parasite in maturer flies. The flies in age-group 1 are therefore eliminated from the discussion, also those in age-group 3, because they were scarcer. Taking the results of nearly 1,600 dissections of flies in age-group 2, it is shown that there is a fairly regular annual cycle in the rate of infection, at least in this one year. The rate was between 0 and 3 per cent. from November to March, the dry season, and over 6 per cent. for July to October.

The author assumes that the factors which produce "ageing" are equally effective through the year, and that appears to be reasonable. It follows that flies included in age-group 2 are of about the same age at all seasons. Evidently

then, the large discrepancy shown above between the infection rates in the dry and wet seasons is likely to be due to some factor dependent on climate. [We suggest, by analogy with what is known from other species of tsetse, that it is probably due to an effect of temperature, either upon the development of the parasite in the fly or upon the pupa.]

It was found that among 2,313 males the infection rate was 3·7 per cent and among 913 females, 5·8 per cent. These figures are for a whole year, and for all age-groups. We feel that the author should have followed up the interesting lead which he has himself given us, and should have eliminated males and females of age-group 1, or presented his figures in such a way that the reader could do so. One might then discover whether there is, or is not, any difference reasonably to be attributed to sex.

[The paper is of considerable originality, and likely to promote thought for some time to come. It would have gained in strength if the author had made fuller use of the data which he has collected with great industry; for instance, there is surely some information to be derived from the flies in age-group 3, indeed, the reader can dig that out himself from the table. There is also the matter of infection in male and female flies referred to above: there may also be data from the infection rates with *T. congolense*.]

P. A. Buxton

PEDREIRA DE FREITAS, J. L. & MENDONÇA, W. Inquérito sobre moléstia de Chagas no município de Rio Verde (Estado de Goiás). [Survey on Chagas's Disease in Rio-Verde (State of Goiás)] *Hospital*. Rio de Janeiro. 1951, Feb., v. 39, No. 2, 251-61, 8 figs.

The English summary appended to the paper is as follows:—

"The authors carried out a preliminary survey on Chagas' disease in the county ('município') of Rio Verde, Goiás State, Brazil.

"Twenty-six *Triatoma sordida* have been collected in the city of Rio Verde and two of them were infected with *Trypanosoma cruzi*. The blood of 26 persons was submitted to complement fixation test and 3 positive results were obtained; xenodiagnosis was applied to 9 persons and 5 dogs and none of them was infected. Complement fixation test was also applied to 115 school children, with three positive results.

"In the locality of Montevídiu, they examined the inhabitants of 8 houses infested with triatomid-bugs: 26 complement-fixation tests were done, with 9 positive results; 22 xenodiagnosis in humans, 17 in dogs and 10 in cats were carried; in one dog and in two cats they had a positive result. Twenty-five *T. sordida* and 81 *Panstrongylus megistus* were collected; one of each species was infected.

"Complement fixation test was also applied to 42 persons and xenodiagnosis to 30 persons who lived in Montevídiu: 15 positive results were obtained with complement fixation and one result with xenodiagnosis.

"Chronic cardiac forms of Chagas' disease were demonstrated by clinical and electrocardiographic examination.

"Two 'tamanduá bandeira' (*Myrmecophaga jubata*) and one armadillo (*Euphractus sexcinctus*) were examined for *T. cruzi*, with negative result.

FORATTINI, O. P. & DA SILVA, O. J. Resultados das pesquisas de triatomídeos no distrito de Motuca (Município de Araraquara). [Results of a Search for Triatomids in the District of Motuca (Township of Araraquara)] *Arquivos Facul. de Hig. e Saúde Pública Univ. de São Paulo*. 1950, June, v. 4, No. 1, 21-36, 2 maps. English summary (9 lines).

Between December 1949 and March 1950, the authors visited 439 houses in the District of Motuca (township of Araraquara) in the State of São Paulo,

Brazil, in a search for triatomids. These bugs were present in 3 of 83 houses in the town and 88 of 356 houses in the interior of the District. Of these 91 houses, 29 had naturally infected triatomids, an index of 31.8 of such houses or an index of 6.6 of all the houses visited.

Altogether 1,343 triatomids were examined for infection with *T. cruzi*. Of these, 103 of 1,290 *Triatoma infestans* and 2 of 53 *T. sordida* were found to be infected, giving an index for the whole 105 of 7.8.

The findings are given in great detail. Calculations of the various indices are shown, together with figures for the finding of each species of triatomid and examination for infectivity in each of the 91 places harbouring the bugs. Two maps of the District indicate distribution and a long list is presented of localities where negative findings were recorded. *H. J. O'D. Burke-Gaffney*

LEISHMANIASIS

FENDALL, N. R. E. **Kala-azar in the Kitui Reserve. II.** *East African Med. J.* 1951, Feb., v. 28, No. 2, 62-5, 1 map.

Attention was drawn to the existence of a focus of infection of kala azar in Ngomeni, Kenya, in a previous paper [this *Bulletin*, 1951, v. 48, 241]. Six cases were reported. From October 1949 to October 1950 13 further African patients with kala azar were admitted to hospital. Of the 19 cases reported, 12 patients came from Ngomeni, 5 from Endau, and one each from Nuui and Muvukoni.

It seems possible that, in the first case of kala azar occurring in Endau, the patient contracted the disease in Ngomeni where he stayed for two or three weeks. Nuui is on the direct road between these two places and Muvukoni is on this same road but beyond Ngomeni. No further cases have been found in Endau, Nuui, or Muvukoni as a result of local investigations. In the first named, 21 spleen punctures on patients with enlarged spleens showed no fresh cases.

L. E. Napier

SEN GUPTA, P. C., DAS GUPTA, N. N. & BHATTACHARYA, D. L. **Electron and Photomicrographic Studies of the Flagellate Form of *Leishmania donovani*.** [Correspondence.] *Nature*. 1951, June 30, 1063-4, 6 figs.

The flagellate stage of *Leishmania donovani* was studied in photomicrographs and by electron microscopy. For photomicrography, unstained smears [presumably of cultures] were exposed to osmic acid vapour, fixed in methyl alcohol and shadowed with silver. Such preparations show various elevations and depressions in the body of the flagellate, corresponding to the nucleus, its "nucleolus" [= karyosome], and the "parabasal body" [= kinetoplast], together with the rhizoplast and free flagellum. For the study of the internal structures of the flagellates by electron microscopy, the specimens were first subjected to hydrolysis: such preparations showed "opacities corresponding to the site of chromatin material" [?]. The note is illustrated by photo- and electron micrographs. [The purpose of this investigation is not stated, but both from the description and the illustrations it is obvious that the methods used by the author reveal fewer structural details than can be seen in smears stained by one of the Romanovsky methods.]

C. A. Hoare

See also p. 88, NASIRUDDIN, *Phlebotomus argentipes* found in Shimoga District, Mysore State.

CHUNG, Huei-lan, CHOW, Hua-k'ang, CHANG, A. & Ts'ao, Yu-pu. **Stilbamidine in the Treatment of Chinese Kala-Azar, with especial reference to Antimony Resistant and Antimony Hypersensitive Cases.** *Chinese Med. J. Peking.* 1951, Mar.-Apr., v. 69, Nos. 3/4, 171-84. [50 refs.]

The authors report a small series of cases of kala azar in China treated by 4:4'diamidino-stilbene (stilbamidine). The 19 cases included 2 antimony-hypersensitive, that is, cases in which alarming symptoms develop after small doses of antimony, and 10 antimony-resistant cases, that is, cases in which relapse has occurred after normally adequate courses of pentavalent antimony.

In all cases a diagnosis was established by the finding of leishmaniae, usually in the sternal marrow, and cure was established by a negative finding.

The drug was given intravenously as a 0.1 to 0.2 per cent. solution in 5 per cent. glucose, in doses from 1 to 2 mgm. per kilogramme body-weight: the adult dose varied from 50 to 125 mgm.

The total adult dose in ordinary cases varied from 1.53 gm. to 1.9 gm. and in resistant cases from about 2.0 to 3.0 gm.; in the hypersensitive cases 0.725 and 1.75 gm. were given. The total doses relative to body-weight varied from 18.2 to 54.3 mgm. per kilogramme in the ordinary cases and from 35.6 to 61.3 mgm. in the resistant cases.

One patient proved refractory and died, but the remainder were cured; of these cures 9 were classed as "permanent" and 9 as "immediate". In 4 resistant cases splenectomy was performed before the treatment was commenced.

One patient had previously received 6.11 gm. of pentamidine and was eventually "cured" by 2.925 gm. of stilbamidine. [It should, however, be pointed out that the interval between the last dose of pentamidine and the first dose of stilbamidine was only 40 days and during these 40 days 20 injections of Pentostam were given; in these circumstances it is scarcely justifiable to claim the whole credit for stilbamidine, since clinical and parasitological cure frequently take more than a month after completion of treatment to become established.]

The antimony-hypersensitive patients were cured with relatively small doses and showed no special sensitivity to stilbamidine.

The toxic reactions were mild and transient except that one patient developed a trigeminal neuropathy: the infrequency of this common sequel the authors attribute to giving fresh solutions well diluted, and slowly, in individual doses not exceeding 2 mgm. per kilogramme body-weight. [Many of the other observers who have encountered a high percentage of trigeminal neuropathies have taken all these precautions, and some other explanation is necessary; can it be a question of racial differences?] *L. E. Napier*

LEE, T. M. & LING, C. C. **Preliminary Observations on the Treatment of Chinese Kala-Azar with Pentamidine Isothionate.** *Chinese Med. J. Peking.* 1951, Mar.-Apr., v. 69, Nos. 3/4, 160-70, 1 chart. [35 refs.]

Twenty-two patients, admitted consecutively to hospitals in Shanghai, were treated with pentamidine isethionate [referred to throughout as isothionate]. A parasitological diagnosis of kala azar was made in each case.

The drug was given intramuscularly and daily in a 10 per cent. aqueous solution, except in one case in which the intravenous route was used for the first few injections and in another the drug was given on alternate days. The dosage used was that recommended by the manufacturers; one course consisted of 10 to 15 injections of 3 to 5 mgm. per kilogramme body-weight. The maximum total dose was 6.25 gm. One patient was given three courses, six were given two courses and fifteen one course.

Three cases were afebrile ; in 16 of the 19 febrile cases the fever subsided within 10 days and in 18 within 14 days. A table showing the reduction in the size of the spleen is given—little reduction was noted at the conclusion of treatment in those receiving a single course, but in those receiving two or three courses it was more marked. The authors conclude that " the reduction in splenic size is more evident in the cases receiving more than one course of therapy ". [This is of course true, but the implication that it was the subsequent courses of treatment that caused the greater reduction in these cases, though superficially logical, is not necessarily true ; it may have been the longer period of observation since the commencement of treatment, which was an average of 15 days in those receiving one course against 37 days in those receiving two courses. This time factor is exemplified in the one case in which there was any reasonable period of " follow-up " ; this patient had one course only of 12 days' duration and on the twelfth day the spleen, originally 14 cm. below the costal margin, was reduced to 11.5 cm. by the fortieth day to 7.5 cm. and by the fifty-fourth day to 5.0 cm.]

The immediate cure rate was 100 per cent. Most of the patients were refugees and were not followed up, so that it is not known how many relapsed.

The toxic reactions were minimal ; there was slight redness and soreness locally. A patient who received the injections intravenously showed the usual peripheral vascular dilatation and fall of blood pressure, and two patients had an urticarial rash on the 10th and 14th days of treatment. *L. E. Napier*

FOUCHE, V. & MONTESTRUC, E. Un cas de leishmaniose américaine cutanée. [A Case of American Cutaneous Leishmaniasis in Martinique] *Arch. Inst. Pasteur de la Martinique*. 1951, July–Oct., v. 4, Nos. 3/4, 12–13, 1 fig.

ROTBURG, A. Reações de Montenegro precoces e tardias. Dissociação pelos testes quantitativos : incidência e aspectos na leishmaniose tegumentar Americana. [The Montenegro Reaction in Cutaneous Leishmaniasis ; Early and Late Reactions] *Hospital*. Rio de Janeiro. 1951, Feb., v. 39, No. 2, 263–74, 4 figs. English summary.

In cutaneous leishmaniasis the Montenegro reaction following graded injections of leptomonad forms of *L. brasiliensis* occurs early in 48 to 72 hours and again later in 3 weeks or so. In negative cases the early papular eruption dies down in 4 or 5 days. The test is made by injecting 0.1 cc. of suspensions ranging from 1,000 to ten million leptomonads per cc., i.e., quantities from 100 to one million.

The author has carried out the test on 55 patients with cutaneous leishmaniasis and 29 controls suffering from syphilis, blastomycosis, simple ulcers of the leg, granuloma venereum, and tuberculosis, taking readings after 2, 8 and 21 days. As stated above, though in negative cases the papule produced usually fades in a few days, occasionally it remains for some days longer and may thus give rise to doubt, but in true cases the papule is usually larger, 6 mm. or more as against a maximum of 5 mm. and may show a greater degree of inflammation, to vesicle, pustule, and even bulla formation. Surrounding the papule is a halo and as this fades in positive cases the papule becomes more evident and may break down and ulcerate in about a fortnight. It is the author's view that this late reaction is distinct from the early, because there may be no correlation between the severity of the early and that of the late ; the one may be weak and the other strong and *vice versa*. The higher concentration is on the whole more reliable ; with the lower the early reaction, in about one-fourth of his cases, was slight, in fact so slight as to be regarded as negative, but even with these concentrations of 1,000 to 10,000 the changes at the end

of a week characteristic of the late infiltrative reaction would develop, though not in a marked degree. [See also this *Bulletin*, 1947, v. 44, 987.]

H. Harold Scott

CORNEJO, A. Leishmaniosis cutáneo-mucosa americana. Su tratamiento con Glucantime. (Nota previa.) [(Cases of) **Muco-cutaneous Leishmaniasis treated with Glucantime**] *Prensa Méd. Argentina*. 1951, Apr. 6, v. 38, No. 14, 819-23, 5 figs.

Glucantime [2,168 R.P.] is a pentavalent antimonial-antimoniote of N-methyl-glucamine; it is a fine white powder, readily soluble in water, the solution being neutral in reaction, and containing 28.35 per cent. of antimony. Its toxicity is low, much less than that of other known antimonials, and it is rapidly excreted, usually in 24 hours and no trace of it is found in the urine after 48 hours. It is put up in 5 cc. ampoules each containing 1.5 gm. of Glucantime, or 0.425 gm. of antimony. The usual dosage is 0.1 gm. per kgm. body weight, *i.e.*, 6 gm. or 20 cc. for the average adult of 60 kgm.; for children of 10 kgm. the daily dose is 4 cc. (1.2 gm. of Glucantime); of 20 kgm. 7 cc. (2.1 gm.).

Details are given of five patients with leishmaniasis: (1) A man of 59 years, with lesions of the neck, upper lip, nasal septum, and knee. He had had various forms of treatment, tartar emetic, fouadin, yatren, anthiomaline, stibophen, liver, vitamins etc. during a period of 10 years without success. He was given 20 cc. of Glucantime intramuscularly daily for 20 days, repeated after a fortnight's interval. The result was excellent. (2) A man of 39 years, with ulcers of nose, palate and larynx causing aphonia. This patient also had had "all sorts of treatment". A course similar to the last of 20 cc. of Glucantime daily for 20 days led to such improvement that the patient asked for his discharge. This, however, was refused and after an interval of a fortnight a second series was started; but, after the fifth injection, he was feverish and complained of more pain and the administration was temporarily suspended; later 5 more injections were given and cure was complete. (3) A man of 45 years, with lesions of the nostrils and nasal septum. He, too, received 20 injections of 20 cc. and was "almost cured". Twenty days later he had another course of 10 injections and left hospital apparently cured, promising to return in a few days: he failed to do so, but his employer reported that he was going on well. (4) A man of 56 years with leishmanial sores on both wrists, the right thigh and the penis. His treatment was like that of the others, 20 cc. daily for 20 injections and 10 more after a fortnight's interval; cure was complete. (5) A girl of 18 years with lesions of the nose and scars of old lesions on the right cheek. She received 15 injections, each of 20 cc., but not continuously because they caused pain and rise of temperature and she had an attack of epilepsy from which she had suffered from childhood. Later she had 5 more injections which also had to be interrupted because of an attack of measles and pulmonary congestion which was treated by penicillin. Finally, however, in spite of these setbacks, the leishmaniasis was completely cured.

H. Harold Scott

FEVERS OF THE TYPHUS GROUP

CASTORINA, S. Rassegna sulle rickettsiosi umane della Sicilia. [**A Review of the Human Rickettsioses of Sicily**] *Nuovi Ann. d'Igiene e Microbiol.* 1951, Mar.-Apr., v. 2, No. 2, 161-90, 1 map. [49 refs.] English summary.

The author reviews what is known of the incidence of the typhus fevers and Q fever in Sicily. Murine, flea-borne, typhus is widely distributed and there

are a few isolated foci of endemicity of "Mediterranean exanthematic fever" tick-borne typhus. Information regarding louse-borne typhus is scanty and unsatisfactory though in ancient times this disease has been known to occur in severe epidemic form and a few small epidemics have been reported in more recent times, including one with 30 cases in Palermo in 1948-49.

Q fever has been detected in 1949 and 1950 in the Province of Palermo.

John W. D. Megaw

GIROUD, P., JADIN, J. & REIZES, C. Nouveaux résultats concernant les fièvres exanthématiques avec ulcération ou tache noire et les toxoplasmoses au Moyen Congo. [**Further Findings Concerning the Exanthematic Fevers with Ulceration or Tache Noire and the Toxoplasmoses of the Middle Congo**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 422-4.

Among 8 cases of exanthematic fever with eschar, in the Middle Congo region, there were 2 in which positive complement-fixation reactions against *Toxoplasma* antigen were observed at titres of 1-64 or over. In one of these cases there was also a reaction against boutonneuse fever antigen at a titre of 1-32, and it is mentioned that GIROUD and GRJEBINE had already isolated a strain of *Toxoplasma* from a tick, *Rhipicephalus sanguineus*, found on a dog belonging to this patient who had two febrile episodes with eruption. The same observers had isolated another strain of *Toxoplasma* from a patient suffering from exanthematic fever with an eschar.

The *Toxoplasma* antigen employed in the present investigation was obtained from the Rocky Mountain Laboratory.

John W. D. Megaw

GIROUD, P. & CIACCIO, G. L'importance des réactions focales dans les essais de chimiothérapie. [**The Importance of Focal Reactions in Chemotherapeutic Tests**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 416-21.

Experiments are described which are regarded as showing that the rabbit intradermal sensitivity test can be employed in estimating the therapeutic efficacy of certain drugs in rickettsial fevers.

The antibiotics aureomycin, chloromycetin (chloramphenicol) and streptomycin, when injected intradermally into rabbits, were found to have a pronounced neutralizing effect on the rickettsiae of murine and epidemic typhus whether the injections were made at the same site or into distant sites.

The relative efficacy of aureomycin was greatest and that of streptomycin least of the three. Aureomycin and chloromycetin did not inhibit the development of anti-rickettsial agglutinins even when injected in doses sufficient to cause total suppression of the cutaneous reaction.

The rickettsiae were injected in the form of suspensions of the lungs of infected mice. A few examples are given of the results obtained. Aureomycin injected in a dose of 0.01 mgm. neutralized 3.0 mgm. of infected lung injected into the same site, but when injected into a distant site a dose of 100 mgm. of the drug was needed to cause a partial inhibition of the skin reaction. Doses of 0.1 mgm. and 100 mgm. of chloromycetin were needed for neutralization in corresponding conditions.

General indications are given of the methods proposed for carrying out the chemotherapeutic tests.

John W. D. Megaw

BOYD, Harriet M. **Quantitative Estimation of the Rickettsial Antigens in Infected Yolk Sac Membranes by Complement Fixation using a Fifty Per Cent Hemolysis Technique.** *J. Lab. & Clin. Med.* 1951, Aug., v. 38, No. 2, 313-23, 3 figs. [18 refs.]

The author describes a highly complicated method of carrying out a quantitative estimation of rickettsial antigens obtained from yolk-sac cultures.

The method employed is the Kent-Rein complement-fixation test (not yet published) in which a spectrophotometer is used for the standardization of the reagents of the haemolytic system, and the complement-fixing units are estimated on the basis of 50 per cent. haemolysis. Antisera free from non-specific antibodies are employed.

The amount of antigen of *Rickettsia prowazeki* contained in ether-treated yolk-sac membranes of infected eggs is closely correlated with the number of rickettsiae that are present.

The method has been found to permit a 7-fold increase in the sensitiveness of the test as compared with tests based on 100 per cent. haemolysis, but it is applicable only to rickettsial antigens of relatively high degrees of concentration.

John W. D. Megaw

GAULD, R. L. & GOODNER, K. **Epidemic Typhus Vaccine. Antibody Response to a Single Dose among Persons Previously Vaccinated.** *U.S. Armed Forces Med. J.* 1951, Sept., v. 2, No. 9, 1311-15.

A single dose of the commercial Lederle epidemic typhus vaccine was given to each of 55 volunteers, all of whom had received two doses of antityphus vaccine while serving in the U.S. Armed Forces, and most of them had also received one or more annual "booster" doses afterwards. The present test was carried out 3 to 5 years after the last previous dose of vaccine had been given.

The complement-fixation titre before vaccination was 1-8 or over in only 5 of the subjects: 38 to 40 days after vaccination it was 1-16 to 1-256 in all but one case in which it was only 1-4. Another exceptional response was observed in a person whose titre was 1-64 before and after vaccination.

In 47 of the 55 volunteers there was a 16-fold or greater rise in the titre, and altogether the results compared favourably with those following booster doses given 9 months after vaccination.

In 7 of the cases neutralization tests were carried out and in 6 of these rickettsia-agglutination tests with epidemic and murine rickettsiae were also done. The results of all the tests were consistent on the whole. The neutralization titres rose from 1-4 to 1-512 in 3 of the volunteers, and by far the poorest response was a rise from zero to 1-32 observed in the volunteer whose fixation titre rose from zero to 1-4.

It appears from the tables that in 5 of the 6 persons tested the epidemic rickettsia-agglutination titre before vaccination was 1-40 or 1-80 and that in all the 6 there was a 4-fold or an 8-fold rise in titre after vaccination. The murine rickettsia-agglutination titre rose from zero or 1-20 to 1-40 to 1-160; it never rose as high as did the epidemic titre though in two cases it reached 1-80 and 1-160 respectively as compared with epidemic titres of 1-160 and 1-320.

John W. D. Megaw

CURBELO, A., MÁRQUEZ, V. & VECIANA, J. A. La reacción de Weil-Félix en el tifus pinareño. (Sus aplicaciones y limitaciones.) [**The Weil-Felix Reaction in "Pinarian" (Murine) Typhus**] *Rev. Cubana Lab. Clin.* 1951, July-Aug.-Sept., v. 4, No. 6, 262-8. [27 refs.]

The authors describe their experiences with the Weil-Felix test in murine typhus in Cuba. They call the disease *Tifus pinareño* in honour of the medical men of Pinar del Río where the first cases were recognized.

They found great variations among the different strains of *Proteus OX19* available to them and they strongly advocate the establishment of standard materials and methods.

With a sensitive strain of *P. OX19* they found that the maximum titres reached in 21 patients were : 1-160 in 3 cases ; 1-320 in 6 cases and 1-640 to 1-20,000 in the remaining 12.

In tests carried out on 200 control sera from persons who had no attack of fever for at least one year there was only one positive reaction at as high a titre as 1-320, though numerous reactions occurred at titres of 1-20 to 1-160. Positive reactions were much more common among adults (66 among 85) than among children (10 of 75). Among 15 adults inoculated with TAB vaccine 14 were positive, and among 25 children so inoculated 13 were positive.

John W. D. Megaw

MORLAN, H. B. & HINES, Virginia D. **Evaluation of County-Wide DDT Dusting Operations in Murine Typhus Control, 1950.** *Pub. Health Rep. Wash.* 1951, Aug. 17, v. 66, No. 33, 1052-7, 2 figs.

This report brings up to the date, August, 1950, the results of the large-scale experiment recently described by HILL *et al.* [see this *Bulletin*, 1951, v. 48, 976]. The effective control of murine typhus by county-wide dusting with 10 per cent. DDT powder is shown to have persisted for about 3 years, though the early sharp reduction in the numbers of *Xenopsylla cheopis* and infected rats began to be replaced by a gradual upward tendency from about 6 months after the end of the operation ; the numbers, however, are still much smaller than those originally observed and than those of adjoining counties. The number of cases in man remains negligible.

John W. D. Megaw

FUKUZUMI, S., OBATA, Y. & KAGIWADA, R. **On the Trombiculid Mites and Rickettsia discovered in Mt. Fuji Foot Plain.** *Kitasato Arch. Exper. Med.* 1951, Mar., v. 23, No. 4, 11-22, 9 figs.

The authors describe in detail a survey carried out in November, 1949, of three small spots in the foot plains of Mount Fuji in an area recently found to be a focus of tsutsugamushi disease. Among 870 trombiculid mites belonging to four species no *Trombicula akamushi* were found. A strain of *Rickettsia tsutsugamushi* was isolated from a field mouse (*Apodemus speciosus speciosus*) captured in a spot in which no infestation with mites was found in either of the two field mice or of the two moles that were examined. The strain was identical with the "Nigata" strain from one of the long known foci of infection. Although the species of trombiculid responsible for transmission in the area could not be detected, it is mentioned that *Trombicula pallida*, of which 4 were found on a weasel and 6 on a field mouse in the area, is said to be capable of transmitting infection "according to our experiments".

John W. D. Megaw

BAILEY, C. A., LEY, H. L., JR., DIERCKS, F. H., LEWTHWAITE, R. & SMADEL, J. E. **Treatment of Scrub Typhus : Evaluation of Chloramphenicol, Aureomycin, Terramycin and Para-aminobenzoic Acid.** *Antibiotics & Chemotherapy.* New York. 1951, Apr., v. 1, No. 1, 16-30, 5 figs. [22 refs.]

From their own extensive experience and a study of the literature the authors conclude that, in the doses employed, chloramphenicol is preferable to aureomycin, which in turn is preferable to terramycin in the treatment of scrub typhus and other rickettsial fevers.

The first two are equally effective in controlling the diseases but aureomycin is said to cause annoying side-effects, and terramycin caused vomiting in a considerable proportion of cases besides being less uniformly effective in controlling the symptoms.

Para-aminobenzoic acid was found less effective than any of the above three drugs.

One observer has claimed that aureomycin is more effective in preventing relapses than chloramphenicol but the authors regard frequent relapses as being associated with early treatment rather than with the drug employed. It is also mentioned that the samples of terramycin used by the authors were of the earliest unpurified type and that the present highly purified supplies may not give rise to unpleasant reactions.

[The last word has not yet been said regarding the relative efficacy of the newer antibiotics, but it seems evident that any patient suffering from a severe attack of a rickettsial fever will be fortunate if he can obtain treatment by any one of the first three named in the title.]

John W. D. Megaw

LE GAC, P. & GIROUD, P. Rickettsiose vésiculeuse en Oubangui-Chari (A.E.F.).

* [Vesicular Rickettsiosis (Rickettsialpox) in Oubangui-Chari (French Equatorial Africa)] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 413-15.

A patient was admitted to hospital at Bangui with the diagnosis of atypical varicella. Rickettsialpox was suspected because of the occurrence of pronounced nervous symptoms, severe headache, muscular and joint pains, stiffness of the neck and Kernig's sign.

A guineapig was inoculated intraperitoneally with 3.0 cc. of blood from the patient and was sent by air to the Pasteur Institute, Paris, where its serum was found to agglutinate *Rickettsia akari* at a titre of 1-20. This reaction was regarded as "confirming irrefutably the diagnosis of varicelliform rickettsiosis", a name considered suitable in French medical nosology because of a certain resemblance between the eruption and that of varicella.

Identical results were obtained with the sera of two persons from Bouar [presumably in the same area]. Investigations are in progress for the isolation of *R. akari* from the dwarf mouse, *Leggada [Mus] musculoides* Temminck, which is very common in the old houses of Bangui and which is regarded as likely to be the vector.

[If the disease in Africa is confirmed as being caused by *R. akari* the name rickettsialpox, though not euphonious, will probably be regarded as more suitable than varicelliform rickettsiosis. The simplicity of the test regarded as yielding irrefutable evidence of the nature of the disease is in striking contrast with the exhaustive study considered necessary by the workers in the U.S.A., see FULLER *et al.* below.]

John W. D. Megaw

FULLER, H. S., MURRAY, E. S., AYRES, J. C., SNYDER, J. C. & POTASH, L. **Studies of Rickettsialpox. I. Recovery of the Causative Agent from House Mice in Boston, Massachusetts.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 82-100.

A very detailed description is given of a thorough investigation which culminated in the recovery of *Rickettsia akari* from 2 out of 22 house-mice trapped in the place of employment of a woman who had been attacked by rickettsialpox about 7 months earlier, in January, 1950. The attack occurred in Boston, Massachusetts; it was the first to be recognized outside the City of New York.

The present paper will repay study by everyone concerned with the isolation of rickettsiae from infected animals, though so elaborate an enquiry would be practicable only in a highly specialized laboratory. There is, however, a passing reference to a procedure which is generally available, the complement-fixation test carried out on the suspected animal. Among 8 of the mice subjected

to this test, 3 gave positive reactions with rickettsialpox antigens at titres of 1-60, and although neither of the mice from which rickettsiae were isolated gave a positive reaction, it seems likely that the reactions indicated the previous occurrence of infection.

Another finding is of interest in view of repeated statements that the antigens of rickettsialpox are almost indistinguishable from those of Rocky Mountain spotted fever; sera of three guinea-pigs immunized by one of the newly recovered strains gave complement-fixation reactions with standard strains of *R. akari* at titres rising to 1-2,560, 1-640 and 1-640 respectively, whereas in simultaneous tests with Rocky Mountain spotted fever antigens the corresponding titres were 1-160, 0 and 1-10.

The method of investigation adopted was to sacrifice each suspected mouse, make the usual examinations, prepare suspensions of the liver, spleen and brain, inoculate four albino mice intra-abdominally with each suspension, sacrifice one mouse of each group on the 6th to the 10th day for examination and for the preparation of further suspensions for successive passages through mice and through yolk sacs. The attempts to recover rickettsiae from yolk sacs sometimes failed because of bacterial contamination, but in successful cases antigen was obtained for complement-fixation tests, for infecting inocula and for challenge doses of infection in the cross-immunity experiments by which the identity of the organisms was conclusively established.

Twelve of the captured mice were infested by mites, most of which were *Allodermanyssus sanguineus*, the only proved vector of infection. No evidence of infection of the mites or their progeny was detected, but only one of them was collected from a mouse found to be infected. The authors conclude, however, that rickettsialpox infection "may be expected to be found in nature whenever *A. sanguineus* and the house mouse occur in association with each other".

John W. D. Megaw

LE GAC, P., GIROUD, P., CHAMARD, R. & REIZES, C. Gangrène des bourses, consécutive à une fièvre exanthématique du type boutonneux, chez un Africain de l'Oubangui-Chari (A.E.F.). [**A Case of Gangrene of the Scrotum after an Attack of Boutonneuse Fever in an African of Oubangui-Chari (French Equatorial Africa)**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 421-2.

Ten days after the onset of a severe attack of boutonneuse fever, when the patient's temperature had already reached normal, the lower part of the scrotum became gangrenous and in a few days a slough was detached, leaving the testicles exposed. The gangrene was regarded as being caused by rickettsial thrombo-arteritis of the type usually associated with infection by *Rickettsia prowazeki* and extremely rare in boutonneuse fever. There was no evidence that the condition was due to infection of a *tache noire*.

The complement-fixation reaction against *Rickettsia conori* was positive at a titre of 1-60. Agglutination tests with all the "five major" rickettsial antigens were negative.

John W. D. Megaw

SCHUBOTHE, H., BOCK, Marianne & WIESMANN, E. Q-Fieber in Südbaden. Ein Beitrag zur Diagnose, Klinik und Epidemiologie der Rickettsia-burneti-Erkrankung. [**Q Fever in South Baden. A Study of the Diagnosis, Clinical Features and Epidemiology of the Disease**] *Klin. Woch.* 1951, Sept. 15, v. 29, Nos. 35/36, 596-605, 1 fig. [115 refs.]

The authors studied about 30 cases of Q fever in an explosive outbreak in which more than 200 cases occurred between the 5th and 22nd February, 1950, among 1,116 inhabitants of two adjoining villages near Freiburg.

The description of the outbreak is specially instructive in that every point dealt with is discussed in the light of the recorded experiences of other observers. There are 115 references to the literature of the disease.

There was reason to believe that the outbreak was associated with the entry into the area of large flocks of sheep which are brought down from their mountain pastures every winter.

Among the 30 cases studied the onset was sudden in 10 and gradual in 20 ; it was accompanied by chill in 20. Headache was very severe in 11 cases, severe in 7 and moderate or slight in the rest. Insomnia was very pronounced in 11 cases and less pronounced in 7 others. Pulmonary involvement was not a prominent feature, apart from an irritating cough in 12 cases and breathlessness in 5.

John W. D. Megaw

MURRAY, E. S., DJAKOVIĆ, P., LJUPŠA, F. & SNYDER, J. C. **An Outbreak of Q Fever in Sokol, Yugoslavia, August 1950.** *Pub. Health Rep.* Wash. 1951, Aug. 10, v. 66, No. 32, 1032-7. [28 refs.]

In the course of a search for cases of typhus fever of the Brill type in Bosnia during the months of July and August, 1950, the authors were informed of the occurrence of numerous cases of fever in a village, Sokol, of 400 inhabitants. About 50 persons were believed to have been attacked during the first nine days of August.

Ten blood samples were obtained on August 11th ; 6 of these were from patients who were still febrile. Only one of the sera reacted with Q fever antigen, but on August 22nd all but one gave positive reactions at titres which were 1-320 or over in 5 cases.

All the patients had suffered from louse-borne typhus in 1941-45 and all gave low-titre reactions (1-10 to 1-80) with complement-fixation tests against epidemic-typhus antigens. There was, therefore, no evidence of anamnestic reactions with *R. prowazeki* antigens or of any immunity against Q fever having resulted from the previous attacks of louse-borne typhus.

The authors mention that they were informed later that JOVANOVIĆ *et al.* had already reported a small epidemic of Q fever in Yugoslavia in 1950, and that epidemiological studies of the outbreak were being carried out by other workers.

John W. D. Megaw

ŠIMOVIĆ, L., VESENJAK-ZMIJANAC, J. & GAON, J. **Epidemija Q-groznice u Bosni. [Q Fever Epidemic in Bosnia]** Reprinted from *Liječnički Vjesnik*. Zagreb. 1951, v. 73, Nos. 6/7, 109-13, 2 figs. [31 refs.] English summary.

This paper contains the report of the epidemiological study referred to in the preceding abstract ; it also contains in tabular form the results of the complement-fixation tests reported in that paper together with the results of later tests carried out on all but two of the same patients and on 7 other patients in the Department for Rickettsiae, St. Gallen (Switzerland) and in the Laboratories of the Microbiological Institute, Zagreb. All the tests gave consistent results and altogether 12 cases were serologically confirmed.

It is stated that all the patients had been engaged in threshing the harvest 14 to 30 days before their illness, and infection was thought to have resulted from the inhalation of infected dust.

John W. D. Megaw

CLARK, W. H., BOGUCKI, A. S., LENNETTE, E. H., DEAN, B. H. & WALKER, J. R. **Q Fever in California. VI. Description of an Epidemic occurring at Davis, California, in 1948.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 15-24. [10 refs.]

Between the 6th and 20th weeks of 1948, 56 cases of Q fever occurred among 1,558 students of an Agricultural College in California. During 8 weeks from March 7th to May 1st, 46 of the cases occurred, at the rate of 5 to 7 weekly. Among 96 sheep on the farm 65 gave positive fixation reactions with Q fever antigens. Half of the cases occurred among the 30 per cent. of the students who were being trained in animal husbandry but there were some cases among students who had no direct contact with the sheep. In spite of a very thorough investigation the mode of infection could not be determined, but in view of the dry and dusty conditions prevailing during the period it was thought possible that the inhalation of infected dust may have been the source of infection.

John W. D. Megaw

CLARK, W. H., ROMER, Mary S., HOLMES, M. A., WELSH, H. H., LENNETTE, E. H. & ABINANTI, F. R. **Q Fever in California. VIII. An Epidemic of Q Fever in a Small Rural Community in Northern California.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 25-34, 3 figs.

During February, March and April, 1949, there were 41 cases of Q fever in Colusa, a compact town of about 3,000 inhabitants situated on the Sacramento River in South California. All but one of the patients were males. The occupations of the patients threw no light on the source of infection. The distribution of the cases according to residence was of the random type, but most of the patients were employed in the small business area.

Among 446 sheep belonging to 13 flocks in the neighbourhood, 10.5 per cent. gave positive reactions with Q fever antigen; the percentage in the different flocks ranged from zero to 44.5. Very few of the patients had been in direct contact with the sheep, but most of them had visited the infected farms or had come into contact with the people who worked on the farms. Inhalation of infected dust was considered possible.

John W. D. Megaw

CLARK, W. H., LENNETTE, E. H. & ROMER, Mary S. **Q Fever in California. IX. An Outbreak aboard a Ship Transporting Goats.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 35-43, 1 fig. [16 refs.]

Fifteen cases of Q fever occurred among a crew of 52 of a ship in which large numbers of goats were carried from California on each round trip, lasting about 5 weeks. Out of 223 goats carried on the voyage during which the cases occurred 32 per cent. gave positive complement-fixation reactions and among 227 goats carried on the previous voyage, during which several of the patients had probably been infected, 15 per cent. reacted.

Possible sources of infection were the drinking of infected milk and the inhalation of infected droplets or dust. The illness was well known locally under the name "goat-boat fever".

John W. D. Megaw

LENNETTE, E. H. & WELSH, H. H. **Q Fever in California. X. Recovery of *Coxiella burnetii* from the Air of Premises Harboring Infected Goats.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 44-9, 2 figs. [19 refs.]

Coxiella [Rickettsia] burnetii was recovered from the air of a milking shed in a "goatery" in South California. Twenty-six of 50 goats gave positive reactions against Q fever antigens and rickettsiae were isolated from one out of 6 pools of milk from 31 goats.

Full details are given of the technical methods employed in testing the air, including an illustrated description of the "capillary impinger" type of air-sampling apparatus. Stress is laid on the need for an intensive investigation of the very important problem of air-borne infection of Q fever.

John W. D. Megaw

LENNETTE, E. H., DEAN, B. H., ABINANTI, F. R., CLARK, W. H., WINN, J. F. & HOLMES, M. A. **Q Fever in California. V. Serologic Survey of Sheep, Goats and Cattle in Three Epidemiologic Categories, from several Geographic Areas.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 1-14, 1 fig.

Sera of 16,045 sheep, goats and cattle were tested in California by the complement-fixation reaction.

In North California human infection occurs chiefly through association with sheep or goats, and these were found to give much higher percentages of positive reactions in the endemic areas than elsewhere; in the former areas the percentage for sheep was 18.4 and for goats 15.4; for the general population of the animals the percentages were 3.7 and 0.8 respectively. Among cattle only 0.7 per cent. were positive in the endemic areas as compared with a rate of 2.1 per cent. for the general population of cattle.

In South California, where most of the human cases occur in association with contact with cattle, 22.6 per cent. of these animals reacted in the endemic areas against 4.3 per cent. for the general cattle population.

Although no outbreaks in South California are known to have been associated with infected sheep or goats, as many as 11.3 per cent. of the goats in the endemic areas gave positive reactions; this, the only anomalous finding in the investigation, is not explained.

John W. D. Megaw

KIRBERGER, E. *Die Resistenz der Coxiella burneti in vitro.* [The Resistance in vitro of *Coxiella (Rickettsia) burneti* (to Chemical and Physical Agents)] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, June, v. 3, No. 1, 77-86. [21 refs.]

Most of the tests described were carried out on 10 per cent. suspensions of spleens of mice infected with *Coxiella [Rickettsia] burneti*. Steps were taken to free the suspensions from tissue substance by washing in saline and by low-speed centrifugation; after treatment with chemicals the suspensions were again washed and the rickettsiae were collected by high-speed centrifugation. The viability of the organisms was tested by intraperitoneal inoculation into white mice.

Heating in a water bath at 60°C. failed to kill, even after an hour, but at 65°C. they were killed in 15 minutes. Alcohol (70 per cent.) was lethal in two minutes and so was shaking with ether for one minute. Formalin failed to kill in less than 48 hours at a concentration of 0.2 per cent., but at 0.5 per cent. it killed in 24 hours. "Sagrotan", a commonly used disinfectant, was highly effective, but two other disinfectants, "Zephirol" and "Tego 103", were not satisfactory. The antibiotics, aureomycin and chloromycetin, were inactive. Ultrasonic vibrations and ultraviolet radiation were without effect.

The practical conclusions reached were that for hot-air disinfection a temperature of 70°C. is needed; for disinfection of clothing Sagrotan is recommended, and for the skin 70 per cent. alcohol is suitable.

The author states that the organism must be regarded as belonging to a different group from the rickettsiae of the typhus fevers because of its filterability, greater resistance to heat and chemicals, and its "lack of affinity to *Bac. proteus*". It should, therefore, be called *Coxiella burneti* instead of *Rickettsia burneti*.

John W. D. Megaw

HERZBERG, K. & URBACH, H. in collaboration with Gertrud LÜCK & Erika HARTMANN-HEYN. Untersuchungen mit europäischen Q-Fieber-Antigenen. II. Mitteilung. [A Study of European Q Fever Antigens. Part 2] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1951, Aug. 15, v. 108, No. 5, 459-64.

In this paper the authors show that the rickettsia-agglutinating antigens of Q fever occurring in different parts of Europe are as variable in their properties as the complement-fixing antigens have already been shown to be.

They have, however, found that there is no uniform correlation between the complement-fixing and rickettsia-agglutinating antigens; in some cases the same serum reacted against the former and not with the latter; more rarely the agglutination reaction was positive and the fixation reaction negative.

Examples are given of sera of patients in South Germany which agglutinated local strains of rickettsiae but failed to agglutinate Graeco-Italian and Henzerling strains.

The agglutination test has the great advantage of needing much smaller quantities of the costly antigen than the fixation test, especially when the slide-agglutination test is employed.

The authors reach the disquieting conclusion, which seems to be justified by the findings, that the complement-fixation and rickettsia-agglutination tests for Q fever sometimes yield results which give rise to doubts regarding their strict specificity.

John W. D. Megaw

BARTONELLOSIS

PAYNE, E. H. & URTEAGA, O. **Carrion's Disease treated with Chloromycetin.** *Antibiotics & Chemotherapy.* New York. 1951, Apr., v. 1, No. 1, 92-9, 7 charts. [42 refs.]

Carrión's disease (Oroya fever) was successfully treated in 6 patients with chloromycetin. Fever subsided within 24 hours, *Bartonella bacilliformis* in the blood assumed the coccoid form which is said to mark the termination of the anaemic phase, and a marked reticulocytosis initiated the return of the blood to normal. One patient had a relapse which responded to further treatment. This is the only case described in detail in the text, but the course of events in all 6 is presented in charts, together with one illustrating a fatal case treated with penicillin and streptomycin, responding initially, but succumbing later to a secondary *Salmonella* infection despite further streptomycin treatment. This complication, said to be common, was not seen in any of the patients treated with chloromycetin: it has been pointed out that this drug should be capable of suppressing this secondary infection as well as the primary. L. P. Garrod

YELLOW FEVER

HOOGSTRAAL, H. & KNIGHT, K. L. **Observations on *Eretmapodites silvestris conchobius* Edwards (Culicidae) in the Anglo-Egyptian Sudan.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 659-64, 3 figs. [13 refs.]

"*Eretmapodites silvestris conchobius* Edwards is added to the known mosquito fauna of the Anglo-Egyptian Sudan. A description of its larval and pupal stages is given for the first time, together with field observations on its breeding and biting habits. The fact that mosquitoes of this genus are considered to

be of potential importance in the transmission of yellow fever, and that this form was taken in the endemic yellow fever area of Southeastern Anglo-Egyptian Sudan is mentioned. *Aedes (Stegomyia) simpsoni* Theobald, a known yellow fever transmitter in other parts of Africa, is also listed from the same area."

LUMSDEN, W. H. R. **Probable Insect Vectors of Yellow Fever Virus, from Monkey to Man, in Bwamba County, Uganda.** *Bull. Entom. Res.* 1951, Aug., v. 42, Pt. 2, 317-30, 1 fig. [18 refs.]

The author reviews first the work of recent years in Bwamba County, Uganda, on the dissemination of yellow fever from monkeys of the uninhabited forests to human beings in adjacent settlements. The Africans may acquire their infection with the virus in numerous ways. They may, during visits to the forests, be bitten by mosquitoes normally feeding on and infected from forest monkeys; or mosquitoes infected in this way may fly out occasionally to feed on and infect the Africans in their huts, plantations, or nearby open spaces; on the other hand, mosquitoes usually closely associated with the native population may acquire the virus from monkeys during occasional flights into the forest edge or when the monkeys make raids out into the plantations for food. Earlier work by various authors demonstrates that all these routes for transference of virus from monkey to man are possible. The most suspect mosquitoes are *Aedes africanus* chiefly present in association with the monkeys in the forest, and *Aedes simpsoni*, the characteristic mosquito of the cultivated areas. But, until the present work was undertaken, it was not known by which means transmission from monkey to man usually occurred. In order to clarify this problem, three localities on the edge of the forest were selected and 24-hour catches over 5 days were made of all mosquitoes coming to human bait in the following catching stations, representing different types of environment:—forest canopy, forest floor, huts, plantations and nearby open spaces. These stations were never more, and usually much less, than 130 metres apart. The number of huts in each locality did not exceed five. Particulars are given of the number of persons and the domestic animals present, and of the crops cultivated in each locality.

A table for each locality shows the number of each species of mosquito taken in each of the different types of environment and divides the catch from each environment (except forest canopy) into two parts. One part shows the numbers of a species taken when that environment would, or could, be frequented by Africans in the course of their daily activities; the other part records the numbers taken at other times of the 24-hour day, when the Africans would not normally be present. Thus, it is possible to see what proportion of the total mosquitoes of a particular species caught in any of these localities might feed on the people in the forest floor, the plantations, the huts, or in the nearby open spaces. A mathematical expression is then developed which is an index, in effect, to the relative probability of a mosquito of a particular species biting first in one of these environments and later, on a second occasion, in another. This index is $\frac{ab}{n}$, where n is the total number of mosquitoes of a particular

species taken biting in the locality, a is the number of these biting man in one of the environments, and b is the number biting man in another of the environments which is being compared with the first in this particular. The index is modified to $\frac{a^2}{n}$, where a measure is being made of the likelihood of a mosquito

taking two successive meals in the same environment. A high index indicates that the species in question may frequently bite first in one environment and

take the next meal in the other environment with which it is compared or, if only one environment is being considered, that repeated feeding within that environment is to be expected.

Indices are computed for 8 species of Anopheline and 23 species of Culicine mosquitoes. The relative potential of some of these as yellow fever vectors from monkey to man and the circumstances under which their potential would be most fully developed are then discussed. *Aedes simpsoni* with an index of 42 for biting successively in plantations is by far the highest index for any species under any of the environmental conditions studied or compared. There seems little doubt that the main route of dissemination of yellow fever virus from the forest monkeys to the Africans is through this mosquito acquiring the infection from monkeys (probably the red tail, *Cercopithecus ascanius schmidtii*) during their raids into the plantations, and subsequently feeding on and infecting Africans at work in the plantations. There is probably a secondary route (index 2.1) involving *Aedes simpsoni* infected initially in the same way but biting persons in the open spaces around the plantations and huts. It is not important as a direct intermediary between infected monkeys within the forest and the Africans in the cultivated grounds (indices 1.4 and 1.8).

The method of indices implicates *Aedes africanus* as a carrier of the virus direct from monkeys in the forest canopy to Africans in their plantations, but it is a route of minor significance.

Other species for which the indices suggest some very minor part as intermediaries between monkey and man are *T. (Mansonioides) africanus* and *T. (M) uniformis* and *Eretmapodites chrysogaster*. Interesting species for which results are not incriminating are *Aedes apicoargenteus* and *Aedes vittatus* (not taken in the catches), *Aedes aegypti* (rare) and *Aedes stokesi* (a susceptible species but taken only singly at the forest floor) and *Culex* spp. (very low indices).

The habits and dispersal of *Aedes circumluteolus* and *Aedes palpalis* as seen by the present, and earlier, work indicate that, although indices are high, they are probably unlikely to be vectors of yellow fever, but may be concerned in spreading other forest virus infections.

There is an interesting comparison of the microclimate of African huts with outdoor environmental conditions in the plantations and forest.

It is suggested that the infection of native populations with yellow fever from monkeys in conditions similar to those at Bwamba could be controlled by dispersing plantations away from the forest edge, and applying restrictions to the cultivation of "gonja" banana and colocasia which provide the main breeding places in their leaf axils for *Aedes simpsoni*. D. S. Bertram

KUMM, H. W. & CERQUEIRA, N. L. **The Haemagogus Mosquitos of Brazil.** *Bull. Entom. Res.* 1951, July, v. 42, Pt. 1, 169-81, 7 figs. & 2 coloured pls. [15 refs.]

Because of their important rôle in the epidemiology of jungle yellow fever the *Haemagogus* mosquitoes of Brazil have been studied intensively. This paper contains a summary of all the information to date concerning prevalence, distribution and taxonomy.

For accurate identification it is necessary to examine male genitalia. For females the procedure adopted for this work was to isolate living individuals, obtain the eggs laid by them, rear them through to adults, dissect out the male genitalia of the progeny and thus ascertain the correct identification of the females originally captured.

The species in Brazil are *H. tropicalis* from one locality only, Curralinho, Pará ; *H. spegazzinii* fairly widespread, *H. s. falco* in the north west, *H. capricorni* generally in the south-east and *H. uriartei* widespread in the north-east States. The detailed distribution is given in the text and plotted on maps in relation to altitude and rainfall. There are keys to the adults, male terminalia and larvae and the distinguishing characters are illustrated, two plates being in colour. The commonest and most widely distributed is *H. spegazzinii* and it can only be distinguished from the other proven vector of sylvan yellow fever, *H. capricorni*, by the male genitalia. H. S. Leeson

KUMM, H. W. & CERQUEIRA, N. L. **The Rôle of *Aedes leucocelaenus* in the Epidemiology of Jungle Yellow Fever in Brazil.** *Bull. Entom. Res.* 1951, July, v. 42, Pt. 1, 195-9, 2 figs. & 1 coloured pl.

Aedes leucocelaenus has been shown to be a natural vector of the virus of yellow fever on two occasions, in Brazil in 1938 [this *Bulletin*, 1939, v. 36, 27] and in Colombia in 1944 [*ibid.*, 1944, v. 41, 475] ; it has also proved, in several experiments, to be a good laboratory vector of the virus. It is, however, not an abundant species in all the areas in Brazil where human cases have been recorded.

The authors have assembled considerable information about the distribution of this mosquito and give a list of 124 localities in Brazil where it has been captured ; the positions of these places are shown on a map. The mosquito is widely distributed throughout the forested area, but in the northern part of the country it is not so important as a natural vector of yellow fever as *Haemagogus spegazzinii*.

A coloured plate shows the characteristic markings of the adult mosquito and a line drawing is given of the larva. H. S. Leeson

HAHN, R. G. **A Combined Yellow Fever-Smallpox Vaccine for Cutaneous Application.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 50-70. [28 refs.]

A new type of combined yellow fever vaccine has been developed which consists of a mixture of the 17D strain with vaccinia virus ; the vaccine is inoculated by scarification and the method appears to combine the merits of the French and American methods without suffering from their respective disadvantages. The 17D component of the vaccine is prepared in the usual manner to the stage of homogenizing the infected chick embryos ; a 50 per cent. solution of gum arabic is then added to give a final concentration of gum of 15 per cent. followed by 1/5th volume of phenolized vaccine lymph, and the combined product is mixed and dispensed into ampoules in amounts of 0.5 or 1.0 cc. The ampoules are then dried *in vacuo*, filled with nitrogen and sealed.

In preliminary experiments two rhesus monkeys were vaccinated with the combined preparation by means of a single scratch 10 mm. long ; two monkeys were treated with the vaccine containing 17D virus only, and three others with French neurotropic yellow fever vaccine. In the latter group virus regularly appeared in the blood between the 3rd and 7th days after vaccination ; in the other animals 17D virus was detected only infrequently and in much lower concentration, but neutralizing antibodies appeared in the serum and the animals were immune to subsequent challenge with a virulent strain of yellow fever virus.

Similar results were obtained in 8 human volunteers living in the Lagos area who were vaccinated with a preparation of 17D virus only ; all developed

satisfactory immunity. A test was also carried out on 80 inmates of a Nigerian leprosarium, some of whom were already immune to yellow fever. They were divided into groups of 20, vaccinated with neurotropic or 17D virus, with or without vaccinia respectively. Circulating virus was detected in 61 per cent. of persons receiving neurotropic yellow fever virus, and in only 43 per cent. of those treated with 17D vaccine. The antibody response was studied in 44 persons who had no immunity at the beginning of the experiment; 22 treated with neurotropic virus all had a high degree of immunity after 6 weeks, whereas similar immunity was found in 19 of 22 persons treated with 17D vaccine. All of the latter group were immune when tested after 5 to 10 months. The 17D virus thus produces a slower immune response than the neurotropic strain. The response to vaccinia virus was mostly satisfactory.

In another experiment with 42 human volunteers it was found that the 17D vaccine produced immunity before the appearance of neutralizing antibody in the serum: 17 persons were vaccinated with the neurotropic strain and circulating virus was subsequently detected in 11 of them, whereas no virus was detected in 19 persons vaccinated with 17D virus and then with neurotropic virus 4 days later; vaccination with 17D virus thus confers immunity to subsequent challenge with neurotropic virus at a time when detectable antibodies have not yet appeared. Six persons were found to be immune at the beginning of the experiment and were therefore excluded. Satisfactory immunity was present in both groups when tested one month later.

A field trial of the 17D vaccine was carried out in the British Cameroons, in which 3,808 persons were vaccinated by scratch and 623 by injection. Sera were obtained from 116 persons before vaccination, and 102 contained no antibodies: of 41 persons tested 3 months later, 38 had become immune (92 per cent.); 23 of 26 persons who were vaccinated by injection became immune (88.5 per cent.). Immunity also developed in 65 of 68 other persons who had been vaccinated by scratch (95.6 per cent.), and in 20 of 23 persons who had been vaccinated by injection (87 per cent.). Stability of the 17D component of the desiccated vaccine during storage at 4°C. was investigated by carrying out titrations at intervals; titres ranging from 135 to 67,000 were obtained, and satisfactory values were usually found after storage for as much as 2 years. The vaccinia component also maintained a satisfactory potency during storage for 16 months.

D. J. Bauer

RABIES

STEER, A., BURNS, K. F. & OLIN, W. G., Jr. **A Case Report of Human Rabies.** *Amer. J. Clin. Path.* 1951, Oct., v. 21, No. 10, 961-4, 2 figs.

"A soldier bitten on the thumb by a rabid dog was given a complete series of prophylactic treatment with anti-rabic vaccine, starting nine days subsequent to exposure and completed five days prior to the onset of clinical symptoms. He expired 31 days after being bitten. The isolation of the virus and histologic examination of both the dog's brain and the patient's brain confirmed the diagnosis of rabies. Negri bodies were found in preparations of the dog's brain and in the brains of mice injected with material from both the dog's brain and the patient's brain but not in preparations from the patient's brain."

PLAGUE

DEVIGNAT, R. Variétés de l'espèce *Pasteurella pestis*. Nouvelle hypothèse. [Varieties of *P. pestis*; a New Hypothesis] Bull. World Health Organization. Geneva. 1951, v. 4, No. 2, 247-63. [60 refs.]

In a paper of fascinating interest the author propounds a new hypothesis as an explanation of the association known to exist between the biochemical varieties of *Pasteurella pestis* and their geographical distribution; he classifies the organism according to a combination of two properties, its ability or otherwise to ferment glycerin and to produce nitrous acid in ordinary broth cultures.

					Glycerine fermentation	Nitrous acid production
Var. I	<i>P. pestis orientalis</i>	...	...	...	No	Yes
Var. II	<i>P. p. antiqua</i>	...	...	...	Yes	Yes
Var. III	<i>P. p. mediaevalis</i>	...	...	...	Yes	No

After reviewing existing knowledge of the geographical distribution of these three varieties the author goes on to speculate with regard to their historical origin and the extension of epidemics caused by each.

The possibility of the occurrence of permutations is recognized, but the main hypothesis is based on the assumption that each variety has retained its special biochemical characteristics for hundreds, in one case for thousands, of years.

Variety I is stated to have had its origin in India, Burma and South China. Spreading from Hong Kong by sea it caused the pandemic of 1894 and later years.

Variety II is believed to have had its home in Central Asia and to have spread westwards with the Aryan invaders, causing the first epidemic clearly recognizable as plague by study of historical records. This was the epidemic among the Philistines about 3,000 years ago, described in the book of Samuel in the Bible as being accompanied by swarms of rats and as causing swellings in the pudenda. It is believed to have persisted and to have spread to Libya, Egypt and Syria where it caused epidemics in the later centuries of the pre-Christian era. During this period it may have extended by water-borne traffic to Central Africa where it still exists. It is believed also to have caused the great "Justinian" pandemic which ravaged the whole of the Roman Empire in the 6th century, A.D.

Variety III may have arisen by gradual transmutation from variety II; it is supposed to have caused the "black death" which is stated to have killed 25 million people in Europe in the middle of the 14th century, and to have extended to the regions of South-East Russia, Mongolia and Manchuria, where it still persists.

The ingenious hypothesis proposed by the author may be regarded by some readers as speculative, but nobody can fail to enjoy a perusal of the paper.

John W. D. Megaw

GUNNISON, J. B., LARSON, A. & LAZARUS, A. S. Rapid Differentiation between *Pasteurella pestis* and *Pasteurella pseudotuberculosis* by Action of Bacteriophage. J. Infect. Dis. 1951, May-June, v. 88, No. 3, 254-5. [10 refs.]

The authors describe methods of production and employment of a bacteriophage by which 35 virulent and 17 avirulent strains of *Pasteurella pestis* were

lysed at 20°C., whereas none of 45 strains of *Pasteurella pseudotuberculosis* was lysed in similar conditions.

Workers interested will wish to read the original paper for details of the technical methods employed.

John W. D. Megaw

SEAL, S. C., GHOSAL, S. C. & BOSE, P. N. **Notes on the Bamboo Flowering, Migration of Rats and their Unusual Mortality in certain Districts of North Assam.** *Calcutta Med. J.* 1951, May & June, v. 48, Nos. 5 & 6, 149-55; 195-9, 1 diagram, 1 map & 1 graph.

CHOLERA

SAHA, H. & DAS, A. **Observations on Biochemical Findings of the Blood in Cholera.** *J. Indian Med. Ass.* 1951, Sept., v. 20, No. 12, 427-30. [12 refs.]

Biochemical estimations were carried out on the blood of 49 patients suffering from cholera, immediately after admission to hospital and before commencing treatment. The results are given in a table. The findings show: increased specific gravity of the blood and plasma in practically all cases, plasma protein concentration above normal values in all cases, serum sodium below normal minimum in 87 per cent. of cases, serum potassium above normal in 60 per cent. of cases, blood chloride ions usually within normal range, plasma inorganic phosphorus above normal in 75 per cent. of cases, and reduced carbon dioxide combining power of the plasma in all cases. [Not every patient had all examinations made.]

The authors estimate that for Indians of average weight and height the normal plasma volume will be 2.5 litres and the total extracellular fluid space will be 10 litres. On that basis and after making corrections for haemoconcentration and increase of the protein concentration of the plasma, the calculated average plasma volume of the series of cases examined is 1.6 litres.

Estimations on four cases by the dye method gave an average plasma volume of 1.7 litres, representing a loss of 0.8 litres (32 per cent.) of the plasma fluid. By the thiocyanate method the average total extracellular fluid in the same cases was estimated at 7.7 litres. The total fluid loss is thus 2.3 litres of which 0.8 litre is from plasma and 1.5 litres from the interstitial spaces.

Although there is no appreciable alteration in the plasma chloride concentration the loss of 2.3 litres of body water will be accompanied by the loss of 8.83 gm. of chloride ions (14.5 gm. of NaCl).

It is calculated that the average sodium loss from intracellular fluid is 11.6 gm. in the series of cases examined, the loss of sodium being disproportionately greater than that of the chloride ion. The non-chloride sodium loss (assuming that all the chloride lost from the body is in the form of sodium chloride) amounts to 5.7 gm.

Some of the sodium loss will obviously be in the form of sodium bicarbonate and in 2.3 litres of water the body loses 28.75 m. eq. of bicarbonate ion. With this there will be a drop in CO₂ combining power from 65 volumes to 35 per 100 ml. This depletion of alkali reserve is a factor in the production of acidosis. The higher levels of potassium found are considered to be due to haemoconcentration, the total potassium content of the body not being greatly altered. The increase in phosphate appears to be a true retention, possibly due to anuria.

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

PÖHN, H. P. Untersuchungen über die Häufigkeit von Darmamöben. [**Study of the Incidence of Intestinal Amoebae (in Germany)**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 173-80. [53 refs.]

The English summary appended to the paper is as follows :—

“ 165 patients of Frankfort University hospitals were examined as to the finding of intestinal protozoa and the following result could be stated : infected with protozoa were 65 persons, that is 40%.

“ Among them were found 4 times *Entamoeba histolytica* (2.4%), once *Entamoeba hartmanni* (0.6%), 16 times *Entamoeba coli* (10%), 48 times *Endolimax nana* (29%), 5 times *Iodamoeba bütschlii* (3%), 5 times *Lamblia intestinalis* (3%), and in 6 cases different other flagellates (3.7%) ; 100 patients (=60%) were free from protozoa. 3 of the 4 persons infected with *Entamoeba histolytica* had contracted the infection directly in the tropics or subtropics, and also the fourth case may be reduced indirectly to an infection in endemic zones.

“ The *Entamoeba histolytica* is rare in Germany, shows no special tendency of spreading and is unable to cause diseases because of the lack of epidemiological factors. The harmless apathogenic intestinal amoebae can be found, however, also in Central Europe.”

NEGhme, A. & SILVA, R. Nueva contribución al estudio epidemiológico de la amebiasis y otras enteroparasitosis en Chile. [**Epidemiological Study of Amoebiasis and Other Intestinal Parasitic Diseases in Chile**] *Bol. Informaciones Parasitarias Chilenas*. 1951, Apr.-June, v. 6, No. 2, 21-3.

The English summary appended to the paper is as follows :—

“ Up to March 1951, 8,390 individuals have been examined, from 46 different sub-urban and rural districts of Chile, lying between south latitudes 18° and 43°. The representative samples were collected without any selection neither in age or sex.

“ In 1980 individuals, cysts of *Entamoeba histolytica* were found. The distribution of amebic infection seems to be uniform in all the country and its frequency ranges between 20 to 30 percent. In the province of Santiago the incidence is about 30%. People over 15 years old are more frequently infected.

“ *Giardia lamblia* is more frequent in children and its incidence has variations according with geographical zones, being more common in the north and central part of Chile in which reaches percentages from 7 to 24%. In the southern part ranges from 2 to 12%.

“ *Ascaris lumbricoides* and *Trichuris trichiura* are close related with the humidity of soil. Thus, in the dry north, *Ascaris* is very uncommon, varying from 1 to 8%, while in the central part reaches frequencies from 18 to 46% and in the southern zones ranges from 21 to 65%.

“ *Hymenolepis nana* is commonest tapeworm in Chile ; it is more frequent in children and in the northern and central part than in the southern ones. Its percentages ranges from 1 to 15%.

Up to now, 18 human cases of *Diphyllbothrium latum* have been discovered in Chile. In 35 individuals, eggs morphologically similar to those of *Trichostrongylidae* family. Moreover, 14 human cases of *Balantidium coli* have been found.”

WILMOT, A. J., ARMSTRONG, T. G. & ELSDON-DEW, R. **The Comparative Value of Amoebicidal Drugs.** *J. Trop. Med. & Hyg.* 1951, Aug., v. 54, No. 8, 161-5, 1 chart.

A study of the therapeutic effect of many drugs has been made during recent years on African cases of amoebiasis in Natal, South Africa [this *Bulletin*, 1949, v. 46, 259 and 831 ; 1950, v. 47, 241, 628 and 994]. In this paper the authors briefly record their conclusions as to the relative efficacy of some of the older and some new amoebicides in the treatment of African patients suffering from the acute and grave amoebic dysentery so prevalent among them in this area. They give the following summary :—

“(1) The commonly used amoebicidal drugs, emetine, emetine bismuth iodide, diodoquin, carbarsone, and yatren and some others have been tested individually in a standard amoebic dysentery occurring in Africans and covering large numbers of cases. The criteria of diagnosis and response to treatment have been rigid.

“(2) The results give information on the value of the test drugs only in clearing the patients of symptoms, ulcers, and amoebae after twenty days from the start of treatment. No information is presented on follow-up or permanent clearance.

“(3) Emetine, diodoquin, E.B.I. and yatren appear to have a statistically similar effect. The high absolute failure rate with carbarsone places this drug in a lower category of usefulness. All leave a high residue of unimproved cases.

“(4) When E.B.I. is used there is an imperative need for the use of powder in gelatine capsules. The manufacture of compressed E.B.I. pills should be discontinued forthwith.

“(5) Other drugs recently placed on the market, Milibis and Aralen, have been found inferior to emetine and cannot be recommended for intestinal amoebiasis.

“(6) This must be emphasized that this paper is purely a comparison of the effects of amoebicidal drugs used singly and is not a recommendation for individual therapy. We have shown elsewhere that some antibiotics when used either alone or in combination with amoebicidal agents are far more efficacious.”

A. R. D. Adams

RADKE, R. A. **Amebiasis. Evaluation of New Therapies.** *U.S. Armed Forces Med. J.* 1951, Aug., v. 2, No. 8, 1231-4.

The author has already claimed that quinacrine [mepacrine] possesses amoebicidal properties both *in vivo* and *in vitro* [see this *Bulletin*, 1951, v. 48, 808]. For the treatment of intestinal amoebiasis he considers that another amoebicidal drug should be used in addition to mepacrine. Carbarsone was selected “as being the most promising from the standpoint of eliminating the cystic stage of the causative organism in cultures”, and from the human intestine. Patients were treated therefore with mepacrine and carbarsone concurrently. Other groups of patients were treated with chloroquine and carbarsone, with aureomycin alone, and with mepacrine, carbarsone and aureomycin. Before treatment in all cases *Entamoeba histolytica* was demonstrated in material aspirated from visible rectosigmoidal lesions or, where no lesions were visible, from the faecal stream. After treatment sigmoidoscopy was repeated within a period of 30 to 90 days, and at least three smears and a culture were taken. Even if these latter proved negative the persistence of visible lesions was held to indicate failure of the treatment, in spite of a failure to find parasites.

The dosage of mepacrine employed was 0.1 gm. four times daily for 15 days ; that of carbarsone 0.25 gm. three times daily for 10 days ; that of chloroquine 0.25 gm. four times daily for 15 days ; that of aureomycin, when used alone, 0.5 gm. four times daily for 7 days, and when given with other drugs 0.25 gm. twice daily for 5 days. Women and children were given dosages proportionately less.

Thirty-five patients were treated with mepacrine and carbarsone, with an 11 per cent. rate of failure of treatment as judged by the above-stated criteria ; 38 were treated with chloroquine and carbarsone, with 78 per cent. failures ; 33 were treated with aureomycin alone, with 65 per cent. failures ; and 33 with aureomycin, mepacrine and carbarsone, with 12 per cent. failures. The patients treated with mepacrine-carbarsone were usually free of symptoms within 5 days ; those treated with chloroquine-carbarsone in 5 to 7 days ; those treated with aureomycin in 2 days ; and those with aureomycin-mepacrine-carbarsone also in 2 days. A significant toxic side effect, in the form of a peculiar paresis of pupillary accommodation, was observed in every patient treated with chloroquine-carbarsone, and these patients also suffered from severe nausea and vomiting. Toxic side-effects of the other courses of treatment were not of any particular severity or significance.

The author considers his mepacrine-carbarsone course to be satisfactory for the ambulant treatment of the ordinary out-patient with amoebiasis ; aureomycin may be added to this combination in severe cases, or where previous treatment has failed to effect a cure.

A. R. D. Adams

CALERO M., C. Aureomycin in the Treatment of Intestinal Amebiasis. Report on 44 Cases. *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 566-8.

After an analysis of the literature on the dosage of aureomycin and its efficacy in curing [sterilizing] intestinal infections with *Entamoeba histolytica* the results obtained in the treatment by the author of 44 patients with amoebiasis are briefly recorded.

The dosages employed were 15 gm. in 1 case ; 12 gm. in 5 cases ; and 8 gm. in 36 adult cases ; 2 children each were given 3 gm. Nineteen of the patients were asymptomatic, and these received 30 mgm. per kgm. of body weight each day ; 25 of them were suffering from symptoms of colitis, which in all but two instances were insufficient to require treatment in hospital. These two patients suffered from an amoebic hepatitis and an amoebic liver abscess respectively, in addition to colitis. None of the patients other than these two was in hospital. The assessment of cure rested on stool examinations [the number is not stated] ; by this means it was estimated that 86 per cent. of those treated were cured. [It is to be inferred, though it is not stated, that the amoebic liver infections responded to aureomycin treatment.]

A. R. D. Adams

BURCKHALTER, J. H. & EDGERTON, W. H. A New Type of 8-Quinolol Amebacidal Agent. *J. Amer. Chem. Soc.* 1951, Oct., v. 73, No. 10, 4837-9. [Refs. in footnotes.]

TUPAS, A. V. & DAUIS-LAWAS, D. F. The Liver Complication of Amebiasis in Children. *J. Philippine Med. Ass.* 1951, June, v. 27, No. 6, 397-403. [12 refs.]

Attention has already been directed to an increased incidence of amoebic dysentery in children in some parts of Manila immediately after the war years (TUPAS, JONGCO, DAUIS and CHAN, *J. Philippine Med. Ass.* 1946, v. 22, 293). The disease took the form it commonly assumes in adults. In view of

the previous rarity of intestinal amoebiasis in children amoebic liver abscess in childhood has hitherto been almost unknown. In the Philippines at the present time, however, hepatic amoebiasis in children is no longer extraordinary ; five cases of this condition are here recorded.

The affected children were aged 5 years, 9 years, 4 years, 7 years, and 7 years respectively. The first three of these suffered from clinical amoebic hepatitis, which resolved on emetine treatment ; all three had microscopically proven intestinal amoebiasis, and two of the three had suffered from a bloody and mucoid diarrhoea. The remaining two children had well-developed amoebic liver abscesses ; the diagnosis in each of these two was proven at autopsy, as both children died within a short time of admission to hospital.

A. R. D. Adams

SODEMAN, W. A., DOERNER, A. A., GORDON, E. M. & GILLIKIN, C. M. **Chloroquine in Hepatic Amebiasis.** *Ann. Intern. Med.* 1951, Aug., v. 35, No. 2, 331-41, 7 figs. [10 refs.]

Seven patients suffering from amoebic hepatitis were treated with chloroquine ; a history and the clinical and therapeutic data relevant to each are detailed.

The first patient, who suffered from recurrent amoebic hepatitis, was treated with 0.6 gm. of chloroquine base daily for two days and then 0.3 gm. daily for more than 30 days. Symptoms and signs of the hepatitis vanished by the eighth day ; after the 19th day as parasites were still present in the stools diodoquin was given daily for three weeks. Nine months later the patient remained asymptomatic [but there is no record of stool examinations].

The second patient suffered from an acute liver abscess which failed to respond to emetine treatment ; after 8 days of this he was put on chloroquine in the dosage already mentioned, and concurrently he was given diodoquin. The fever disappeared in four days, but on the 11th day liver abscess material was coughed up ; no amoebae were found in this. As fever then recurred resort was had to emetine, penicillin and streptomycin, and the symptoms and signs subsided.

The third patient had a chronic liver abscess which was draining profusely through the chest wall and which emetine, penicillin, and streptomycin had failed to clear [the description suggests that there was a cutaneous amoebic infection at the site of the discharge]. Though amoebae were present in the abscess discharge, no parasites were found in the stools. The patient was treated with emetine, with chloroquine, with penicillin and streptomycin, and with diodoquin concurrently, and immediately and progressively improved.

The fourth patient suffered from an acute hepatic abscess which was treated with chloroquine (1.0 gm. daily), penicillin and streptomycin ; on the second day of treatment a laparotomy was thought desirable and during it the abscess was drained by aspiration. The daily dosage of chloroquine was then reduced from 1.0 to 0.5 gm., but as the fever continued high it was increased on the fourth day to 1.0 gm. daily for two days ; the condition then improved and the dosage again was reduced to 0.5 gm. daily. Progress thereafter was steady and when the patient was convalescent diodoquin treatment was started ; he remained well throughout a short period of observation.

The fifth patient had a draining liver abscess, and amoebae were present in the discharge. He failed to improve during 10 days of emetine treatment, and subsequently he did not respond to 0.5 gm. of chloroquine daily for 12 days. After an unavoidable break in treatment he was again treated with emetine for 5 days and with chloroquine, 0.25 gm. daily for 12 days, concurrently ;

there was no improvement in spite of further aspiration. Thereafter prolonged chloroquine treatment at twice this dosage, with repeated aspiration, after some delay brought the condition under control and ultimately to a satisfactory conclusion.

The sixth patient suffered from an acute amoebic hepatitis; *Entamoeba histolytica* cysts were present in her stools. The hepatitis cleared after daily dosage with 2.0 gm. of chloroquine for 2 days and 1 gm. daily for another few days. She was then given diodoquin, with apparent subsequent cure.

The seventh patient, who suffered from an acute amoebic hepatitis, was similarly treated with a like result.

In assessing the results the conclusion is reached that chloroquine, like emetine, is immediately effective in clearing the local infection in most, though not all, cases of amoebic liver infection. If at first the liver infection does not respond to chloroquine treatment it subsequently will do so. There was no evidence of serious chloroquine toxicity in any of the cases reported.

A. R. D. Adams

HARINASUTA, C. **A Comparison of Chloroquine and Emetine in the Treatment of Amoebic Liver Abscess.** *Indian Med. Gaz.* 1951, Apr., v. 86, No. 4, 137-42, 3 charts.

The author tried chloroquine treatment in 45 cases of amoebic liver abscess, several with complications. As a comparison he treated 45 more cases with emetine.

Chloroquine was administered orally in the accepted dosage with a primary dose of 0.6 gm. of the base daily for two days, followed by 0.3 gm. daily for 12 or 19 days, the complete course lasting 14 or 21 days. In one patient with gastro-intestinal intolerance the drug was given at first by the parenteral route. Emetine, intramuscularly, was administered in $\frac{1}{2}$ grain daily doses for 18 days or one grain daily for 9 days.

The majority of abscess cases responded to aspirations which sometimes had to be repeated ten times. Open operation with drainage was necessary in 18 cases where the abscess was large or had ruptured into the abdominal cavity.

The first group of cases, 14 in number, were subjected to a two-week course. Of these 10 were cured, 3 relapsed and 1 died.

The second group consisted of 28 cases, subjected to a three-week course; 19 responded, 7 relapsed and 2 died.

Three are included in the third group, all of whom were in a serious condition, and died within 72 hours.

Forty-five patients were treated with emetine; 39 were cured with one course of 9 grains of emetine. In one the abscess burst into the right pleural cavity during a course of the drug.

In these 90 cases, 9 of which were in females, 61 gave a history of dysentery, but in 14 only were cysts of *E. histolytica* demonstrated in the stools. *E. histolytica* was however found in 11 cases—2 at aspiration and 9 at operation.

Two cases were secondarily infected, with *Bact. coli* and *Staphylococcus aureus* in one case and with *Bact. coli* only in the other. There were 6 others who developed pyogenic infections, secondary to repeated aspiration.

With chloroquine, results were satisfactory and a single course produced satisfactory results in 64.44 per cent. Relapses subsequently appeared in 22.2 per cent. These findings appeared to indicate that chloroquine in a course of 2 or 3 weeks could not eradicate *E. histolytica* in liver abscesses. For a small abscess with mild symptoms a course of 2 weeks might suffice, but for a large cavity one course or even two of 3 weeks might not be enough.

Definite refractoriness to chloroquine was observed twice and *E. histolytica* was found active in the abscess walls. A severe side-effect was observed once. The patient developed epileptiform convulsions after a prolonged course.

As regards immediate effects, chloroquine and emetine appear to have the same value. The influence on the acute symptoms was similar, but the mortality in the chloroquine group was greater. Though inferior in eradicating the parasites, chloroquine has certain advantages. It can be given by the mouth, is well tolerated and produces fewer toxic manifestations than emetine. There were no contra-indications even in prostrated patients.

P. Manson-Bahr

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

SCHUHARDT, V. T. & WILKERSON, Martha. **Relapse Phenomena in Rats infected with Single Spirochetes** (*Borrelia recurrentis* var. *turicatae*). *J. Bacteriology*. 1951, Aug., v. 62, No. 2, 215-19, 2 figs.

The authors inoculated 11 white rats with single spirochaetes of *S. turicata*, isolated by means of microcapillaries. Four of these rats became infected and the course of the infection was essentially similar to that produced by the bites of single ticks.

Antisera collected from each of the four infected rats 30 days after inoculation immobilized all the antigenic varieties of the spirochaete tested including first attack, relapse passage and late brain passage, suggesting that each individual spirochaete possesses the inherent antigenic variation capacity of the strain to which it belongs. The antisera of these rats showed a constantly rising spirochaeticidal titre against first-attack spirochaetes which would prevent these antigenic varieties reappearing in relapses. Blood from one rat was collected on the 10th, 12th, 15th, 21st and 30th days after inoculation of a single spirochaete and the sera were tested for spirochaeticidal activity against first-attack spirochaetes. No antibodies could be detected on the 10th day, but by the 12th day a 1 : 2 dilution was effective and the titre gradually rose until at the end of 30 days a 1 : 400 dilution killed all the test spirochaetes. In other rats where relapses were prevented by chemotherapy the titre did not rise above 1 : 10 to 1 : 50.

There was a very great difference between the titre which killed all the spirochaetes (1 : 10) and that which killed 50 to 90 per cent. (1 : 1,600) in serum collected on the 15th day. This is interpreted as being the result of more than one antigenic variety of spirochaete being present in the test suspension. There was a fall in the 50 to 90 per cent. killing titre from 1 : 1,600 to 1 : 400 between the 15th and 21st days, and a subsequent rise to 1 : 3,200 by the 30th day. This fall was correlated with a heavy relapse observed on the 18th and 19th days of the infection.

The authors are of the opinion that there is also a decided reverse tendency to antigenic variation which would account for the relatively smaller numbers of spirochaetes seen in most relapses as compared with the first attack.

E. Hindle

BLANC, G., CHABAUD, A. G. & BRUNEAU, J. Sur les différentes variétés de l'*Ornithodoros erraticus*. I. Note préliminaire: Étude de la souche "Bab er Rhob". [The Different Varieties of *Ornithodoros erraticus*. Study of the Strain "Bab er Rhob"] *Ann. Parasit. Humaine et Comparée*. 1951, v. 26, No. 4, 361-5, 1 map.

In Morocco, the authors have found the large and small forms of *Ornithodoros erraticus* existing together in the same burrows of gerbils. In the laboratory,

the ticks were fed on guineapigs and they and their descendants were separated into groups of large and small ticks. The maximum lengths of the small ticks were found to be, larvae 770μ , males 3.0 mm. and females 3.55 mm.

It seems that in spite of the close association of the two forms in nature, only the large variety carries the *Sp. hispanica*. A sketch map of Morocco shows that the large form occurs mainly in the north and the small one in the south, with both varieties occurring in the zone of contact.

H. S. Leeson

YAWS

JELLIFFE, D. B. **Lymphostatic Verrucosis in a Case of Tertiary Yaws.** *J. Trop. Med. & Hyg.* 1951, Aug., v. 54, No. 8, 165-8, 3 figs.

The author defines lymphostatic verrucosis as a solid thickening of the skin of the feet with the formation of filiform horny processes. It is associated with, and probably caused by, chronic and solid oedema of the feet and legs due to lymphatic obstruction.

The patient reported from Ibadan, Nigeria, was a Yoruba male aged about 35 years who "gave a history of probable yaws in adolescence" with ulcers on both legs. On the right leg was an extensive scar involving almost the whole of the circumference of the lower two-thirds of the limb below the knee. This the author presumes was the cause of the lymphatic obstruction which preceded the verrucose condition of the slightly swollen right foot that had been present for some years. The radiographs of the tibiae showed "typical appearance of tertiary yaws" and the Kahn test of the serum was strongly positive.

The microscopical appearances of the skin showed hypertrophy and great hyperkeratosis. In the cutis were fibrosis and small round cell infiltration.

The paper is illustrated by two photographs and a photomicrograph showing the lesions of the right foot.

[The patient probably had yaws, the scar probably produced the lymphostasis and verrucose lesions, but there is no evidence in this paper that the ulcer that produced the scar was due to yaws.]

C. J. Hackett

LOUGHLIN, E. H. & JOSEPH, Aurele A. **Terramycin in the Treatment of Yaws.** *Antibiotics & Chemotherapy.* 1951, Apr., v. 1, No. 1, 76-87, 13 figs.

In April 1950 the evaluation of terramycin in the treatment of ambulatory yaws was started at the Experimental Yaws Center of the *Service Coopératif Inter-Américain de la Santé Publique*, Gressier, Haiti. This report is based upon 150 patients, of whom one was in the primary stage, 87 were in the secondary stage (of whom 37 still had primary lesions), 17 had dry plantar and palmar lesions only [which the authors appear to regard as secondary lesions], and 45 had tertiary lesions of the skin and bones. The patients appeared sick and were febrile. Many had enlarged lymphatic glands and all were seropositive.

The dose of terramycin hydrochloride used was at first 3 gm. on the first day and 2 gm. on the second and third days (total 7 gm.). After the first 65 cases had been observed for 2 months, when 2 possible relapses were seen, the dose was increased to 2 gm. on 5 successive days (total 10 gm.). The drug was given by mouth. To large ulcerated secondarily infected primary lesions and to extensive tertiary lesions terramycin was also applied locally after the completion of the oral therapy.

In over 80 per cent. of cases treponemata could not be found 48 hours after treatment had started and then lesions had usually become so dry that material for examination was not obtainable.

Primary lesions uncomplicated by bacterial infections or deep ulcerations were dry in 2-3 days and sometimes healing was practically complete in 4 days. When bacterial infections and deep ulcerations were present, healing might be delayed for 10-21 days. Secondary lesions were usually dry in 1-2 days and healed in 5-6 days. Wet secondary plantar lesions were usually healed in 11 days, but if extensive ulcerations and severe bacterial infections were present, this might be delayed for 2-3 weeks. The relief of pain in these lesions was usually complete by the fifth day.

In the treatment of tertiary yaws terramycin was found to be more effective than procaine penicillin. The local application of the drug appeared to continue the healing started by its oral administration. The excellent effects on ulcerated lesions caused the authors to state "the response to topically administered terramycin in these ulcers, some of which extended so deeply as to involve tendons and bone, was so rapid that we are of the opinion that this antibiotic exerted not only an antimicrobial effect but also that it provided a local tissue growth stimulating factor". An ulcerative perforation of the hard palate, 1.5 cm. in diameter, was reduced to about 1 mm. 5 weeks after treatment, a result the authors had never seen following procaine penicillin or the arsenicals.

All general symptoms were relieved in 1-2 days. Nausea, vomiting and anorexia were observed in only 5 children all under 8 years of age. No relapses were observed in patients who received 10 gm. of terramycin [the period of observation after treatment is not recorded]. Two and perhaps 4 primary lesions were observed 6-10 weeks after treatment.

The authors regard terramycin as more effective than procaine penicillin in all stages of yaws but that aureomycin approaches it in its action on "both wet and dry plantar lesions (crab yaws)". The authors, however, state that too short a time has elapsed to allow serological appraisal.

[It is very probable that the action of antibiotics against secondary infection in ulcerated lesions assists their anti-treponemal action in bringing about healing.]

C. J. Hackett

LEPROSY

GUINTO, R. S., DOULL, J. A., BANCROFT, Huldah & RODRIGUEZ, J. N. **A Field Study of Leprosy in Cordova, Philippines. Resurvey in 1941 after Eight Years.** *Internat. J. Leprosy*. New Orleans. 1951, Apr.-June, v. 19, No. 2, 117-35.

This re-survey after a period of 8 years, conducted by a group of four experts in leprology, epidemiology and statistics, gives one of the most interesting studies of the subject that has ever been made. It has the advantage of having been made in a comparatively isolated area with a comparatively fixed population. At the first survey made in 1933 [this *Bulletin*, 1936, v. 33, 931] the population was 6,063, and 115 cases were found, of which 57.7 per cent. were lepromatous. In the 1941 survey the population had risen to 7,076, and 126 cases were found, of which only 44 per cent. were lepromatous. The diminution of lepromatous proportion was due partly to their high mortality and partly to a lower incidence of that type of case. During the 8 years there were 49 new cases of which 18 were lepromatous. Forty-six of the new cases had been previously examined in 1931. Of 51 non-lepromatous cases only 3 had changed into the lepromatous form during the 8 years. Judging from two previous records the number of new lepromatous cases expected was 41 or 37, but it actually was only 18. The lower incidence was presumably at least partly the

result of the anti-leprosy measures taken. [The article is clearly written and is worthy of careful study in the original.]

Ernest Muir

MARIE-SUZANNE, SOHIER, R. & NOËL, R. Étude comparative d'un bacille acido-résistant isolé par culture d'un lépromme humain et du bacille de Hansen. [**Comparative Study of Acid-fast Bacilli isolated by Culture from a Human Leproma, and of Hansen's Bacillus**] *Ann. Inst. Pasteur.* 1951, Aug., v. 81, No. 2, 238-41.

By leaving in normal saline a fragment of leproma rich in bacilli and which had been previously ground up, and then sowing it on Sauton's medium, a culture of organisms was obtained with the following characteristics: polymorphic bacilli with a predominance of rod-like forms grouped in masses, acid-fast and Gram-positive. On inoculation into *Galleria mellonella*, bacilli were recovered after 60 days. Inoculation in guineapigs produced no signs within ten months' observation. In rats it produced the same lesions as Hansen's bacillus, the lesions becoming more attenuated on passage from rat to rat. The authors consider that it is not Hansen's bacillus but has a resemblance to that germ.

Ernest Muir

ALEXANDER-JACKSON, Eleanor. **The Cultivation and Morphological Study of a Pleomorphic Organism from the Blood of Leprosy Patients.** *Internat. J. Leprosy.* New Orleans. 1951, Apr.-June, v. 19, No. 2, 173-86, 20 figs. on 5 pls. [23 refs.]

Three forms of medium were used, a liquid form composed of a glycerol lung broth, a solid one containing in the liquid medium eggs and malachite green, and an agar medium with beef extract, dextrose, yeast extract, gelysate, inyosate and asolectin. Whole citrated blood from 10 out of 11 patients with leprosy was injected into tubes containing the liquid medium. Growths were obtained from 10 of these after 5 days to 2 weeks of incubation at 37°C. "Subcultures from these tubes developed plainly visible, finely granulated clumps which settled to the bottom of the tubes in the form of a mat, while the medium above remained clear. More than 30 bloods from control persons. . . . gave either no growth or else readily identified cocci or diphtheroids." The leprosy blood cultures showed clumps of non-acid-fast granules, large disk or ring forms, occasional free acid-fast granules and short rods and non-acid-fast diphtheroid rods. When the growth from the liquid medium was transferred to egg-malachite green slants there developed a few round semi-transparent non-chromogenic colonies, and in some tubes a few chromogenic colonies. Growth from slants was floated on to the surface of the liquid medium, where it grew extremely slowly and sparsely as small whitish islands, as did also subcultures from these islands. Smears from this surface growth stained by Ziehl-Neelsen showed "plump, short, acid-fast rods and granules". Various morphological changes obtained by growing this organism in various ways, with and without CO₂ gas, are described, also the changes obtained after inoculation into mice. The author's conclusion is "The findings here recorded are consonant with the view that the clinical picture and pathology observed and reported here were due to the organism inoculated, and strongly suggest that this organism is Hansen's bacillus. If the pleomorphic microorganism described is the etiological agent of leprosy, support is given to the view of those who postulate the existence of some form or forms of *M. leprae* other than acid-fast rods alone." [It should be easy to confirm or fail to confirm these findings, as the technique described is very simple and the time required, at least to grow the original cultures, very short.]

Ernest Muir

WILKINSON, F. F. Modificación a la tecnica de Ziehl-Neelsen en las baciloscopias de los enfermos de lepra tratados con sulfonas. [**Modification in the Ziehl-Neelsen Technique in Bacteriological Examination of Leprosy Patients Treated with Sulphones**] *Internat. J. Leprosy*. New Orleans. 1951, Apr.-June, v. 19, No. 2, 195-8. English summary.

Because of the report of FREIRE and RAMOS (*Brasil-Med.*, 1948, v. 62, 281) that the staining of lepra bacilli by the Ziehl-Neelsen method is reduced by treatment of the patient with the sulphones or Rongalita, the author tried out the effect of applying peroxide of hydrogen to smears before using the usual stain. He found in smears from patients treated with chaulmoogra, or in those untreated, that the application of peroxide made no difference; but with the sulphone-treated patients, of the 76 that were positive 52 had more positive fields in the peroxide-treated smears than in the untreated. He therefore recommends the use of peroxide of hydrogen especially in slides that have been found negative by the ordinary method. *Ernest Muir*

KHANOLKAR, V. R. **Studies in the Histology of Early Lesions in Leprosy.** *Indian Council of Med. Res. Spec. Rep. Ser. No. 19.* 18 pp., 2 text figs. & 30 figs. (17 coloured) on 14 pls. [26 refs.]

This important report is well illustrated with 30 photomicrographs and coloured reproductions from photomicrographs. It is chiefly a histological study of patients with very early leprous lesions and of those who, though showing no clinical lesions, have been in contact with open cases. Out of 109 contacts, 42 with positive lepromin tests were found bacteriologically positive, whereas 5 out of the 67 with negative lepromin were bacteriologically positive. In some of these cases "fuchsinophil cells" were found in the vicinity of small blood capillaries. They contained rod-like or granular opaque acid-fast particles, and "it was reasonable to presume that they were adventitial cells which had phagocytised acid-fast bacilli and were in the process of digesting or had almost completely digested them". In early lepromatous lesions (pre-lepromatous) "no bacilli were demonstrated in perineural tissues—or in the adjoining subcutaneous tissue" but only in the nerves. "The bacilli were seen to lie in the axonal space and followed closely the contours of nerve fibres. They thus presented the appearance of fish migrating up stream. Occasional clusters of bacilli were seen irregularly grouped in the cytoplasm of the Schwann cells. In some of the preparations it was possible to demonstrate the presence of blisters or saccules in the perineural sheath in which the bacilli were breaking through.—In another biopsy the axonal space was blown into fusiform swellings which were packed tightly with acid-fast bacilli." [The illustrations of these two last statements, though well executed, are not at all persuasive that the bacilli are actually inside the axis-cylinders. The idea of lepra bacilli actually travelling up inside axis-cylinders is a very revolutionary one, more like a small snake swallowing a large frog than fish swimming up a stream, and would need considerably clearer evidence than is given in this paper before it could be accepted.]

The author's chief contention is that bacilli may pass through the unbroken skin, after which they seek out the fine nerve twigs in the superficial dermis. They can travel from the initial place of nerve entrance especially along the superficial skin plexus, but it is the nerves and not the lymphatics that form their path. And it is in these nerves that the original foci lie, the histiocytes gathering round and forming the epithelioid or Virchow cells according as the patient's resistance is strong or weak. Not only are the bacilli attracted to the nerves of the skin, but they are particularly attracted to migrate to

degenerating and regenerating nerve twigs. Therefore parts of the body liable to injury suffer more from leprous lesions than others; therefore also children, whose skins are more liable to injury than those of adults, are more susceptible to leprosy than adults. Another outcome of the hypothesis that bacilli live, travel and multiply inside or along nerve fibres is: "as a therapeutic measure designed to control the course of the disease the therapeutic agent or its products must reach the axonal substance so as to be able to exert their influence on the bacilli".

Ernest Muir

BOENJAMIN, R. **Vitamin C in the Blood of Lepers and their Healthy House-Mates.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Sept., v. 3, 245-9.

The author, in a paper under publication, has shown that vitamin A insufficiency was found in the blood of the lepromatous, but not the neural type of leprosy. His present study had two objects: is there a correlation between vitamin C insufficiency and susceptibility to infection with leprosy, and does vitamin C influence the formation of the depigmented cells of neural leprosy?

The blood was examined of 38 lepromatous and 60 neural cases of leprosy, and of 95 healthy house-mates. The vitamin C content was approximately the same in the healthy and neural cases, but significantly less in the lepromatous cases. Thus no evidence was found of correlation between vitamin C deficiency and susceptibility to leprosy, and this deficiency in lepromatous cases is probably not a primary factor but a result of the disease.

The reason for the second part of the investigation was that ascorbic acid has been shown to delay or arrest the "dopa reaction" (turning melanogen into melanin in the skin); but no evidence was found of vitamin C deficiency affecting the pigment-formation in neural cases, as in such cases this vitamin was not less than in their healthy house-mates.

Ernest Muir

BASOMBRÍO, G., GATTI, J. C., CARDAMA, J. E., COLOMBO, C. V. & WILKINSON, F. F. **Reaction to Lepromin in Healthy and Affected Skin.** *Internat. J. Leprosy.* New Orleans. 1951, Apr.-June, v. 19, No. 2, 161-4.

There has been a divergence of opinion as to whether the lepromin test gives a stronger, weaker or the same degree of reaction when the site of inoculation is normal skin as opposed to the centre of lesions. This was tested out in 15 tuberculoid, 6 indeterminate and 44 lepromatous cases. In 71 per cent. the results were the same. In the tuberculoid cases where there were differences the stronger reaction occurred more frequently inside the lesion. In the lepromatous cases the opposite effect was seen. In the indeterminates there was no difference.

Ernest Muir

FIGUEREDO, N. & DESAI, S. D. **Lepromin Test in Contacts, with particular reference to Positive Bacteriological Findings.** *Internat. J. Leprosy.* New Orleans. 1951, Apr.-June, v. 19, No. 2, 165-72.

The authors found 54 out of 184 clinically negative contacts with leprosy cases to be bacteriologically positive. This large number they attribute to their method of taking material by biopsy from the skin so as to include fatty tissue, and also to the very thorough examination of smears. Of the 54 positive bacteriologically, 49 were tested with lepromin and 42 had a positive test, whereas 62 of the 130 bacteriologically negative persons who were tested with lepromin were all found negative. On the other hand among the bacteriologically positives it was found that the more the bacilli the weaker was the lepromin reaction.

From these results the hypothesis is put forward that when bacilli first enter the body they sensitize the patient, whatever the type of the leprosy which may develop later. Early leprosy might thus be divided into three stages : positive contacts, primary lesions, and persistent lesions. The Calcutta workers have so far not been able to confirm these findings, and the authors attribute this to their not using the same deep method of making biopsies. [If these findings are in the end confirmed they may be of considerable interest and importance.]

Ernest Muir

ROCHE, M., CONVIT, J., MEDINA, J. A. & BLOMENFELD, Elena. **The Effects of Adrenocorticotrophic Hormone (ACTH) in Lepromatous Lepra Reaction.** *Internat. J. Leprosy.* New Orleans. 1951, Apr.-June, v. 19, No. 2, 137-45, 2 figs.

ACTH was used in 6 cases of severe lepra reaction. The acute symptoms subsided within a few hours, appetite and a feeling of well-being were experienced within 24 hours. Iridocyclitis present in one patient and neuritis in two were rapidly benefited. ACTH was injected in doses of 10 to 20 mgm. every 6 hours. There was a tendency for reaction to return after cessation of the treatment, but not in such a severe form. As reaction in leprosy is considered to be beneficial "it might then be argued on theoretical grounds that to suppress such a reaction represents a dangerous step"; but the action of ACTH, as in typhoid fever, may dissociate the harmful effects of hypersensitivity from the beneficial reaction of immunity.

It is felt that through the rapid control of the reaction symptoms ACTH may contribute in an important way to the treatment of leprosy, particularly in those cases where reaction is an obstacle to continued administration of a chemotherapeutic agent.

Ernest Muir

VAN MEURS, J. H. Een bijzonder geval van lepra nervosa. [**An Unusual Case of Neural Leprosy**] *Nederl. Tijdschr. v. Geneesk.* 1951, Sept. 29, v. 95 (iii), No. 39, 2893-5. [10 refs.]

The English summary appended to the paper is as follows :—

"Description of a leprosy patient who must have been infected at the adult age. Some particulars on differential diagnostics from syringomyelia are added."

ROSS, Hilary & GEMAR, F. **Blood and Urine Concentrations of Free and Hydrolyzed Sulfones in Leprosy Patients under Treatment.** *Internat. J. Leprosy.* New Orleans. 1951, Apr.-June, v. 19, No. 2, 153-60.

This is a study of the question to what extent the activity of the derivatives of diaminodiphenyl sulphone in leprosy is due to the parent substance and to what extent to the unaltered derivative. Four substances were tested : promin, diasone, sulphetrone and promacetin. The first three are true derivatives, but promacetin is not a true derivative of diaminodiphenyl sulphone although that substance is its central nucleus. The blood and urine were examined for concentration of free and hydrolysed sulphone in 275 determinations in 137 patients who had been treated for varying periods with one or other of these drugs. Examinations were made 24 hours and 14 days after the last dose. Only in the case of promacetin was any blood concentration found on the 14th day. With promin the drug was found free in the blood after 24 hours, and in the urine on the 14th day it was partly free and partly hydrolysed. With diasone it was found hydrolysed in the blood in 26 out of

55 cases, and in the urine in 52, both after 24 hours and after 14 days. With sulphetrone there was partial hydrolysis in the blood and urine in all the 15 cases, in 24 hours and in the urine in 8 out of the 15 on the 14th day. The bloods and urines of the 24 promacatin patients showed that this drug is unaltered in the body. In the first 3 drugs there were marked case variations in the power of the body to cause hydrolysis, and this was particularly so with sulphetrone. In none of the determinations an attempt made to identify the degraded substance as diaminodiphenyl sulphone. *Ernest Muir.*

HELMINTHIASIS

CARRI, E. L. & CELLERINO, N. A. Regionalización de las parasitosis en la República Argentina. Etapa preva para encarar la lucha de las enfermedades transmitidas y producidas por parásitos—bases para un índice demográfico. [Nosogeography of Parasitism in the Argentine Republic. Measures to deal with Parasitic Diseases] *Semana Méd.* 1951, Sept. 13, v. 99, No. 11, 482-8, 2 maps.

The plan put forward in this article is ideal, but whether it remains an ideal or whether it can be translated into action the future alone can show. The authors explain that the country is large and embraces all sorts of climates and terrain and, consequently, a large variety of diseases, and it is difficult to establish with any degree of accuracy the geographical zones of distribution of the many parasites which are to be found: malaria, amoebiasis, hookworm and other helminthiasis, most of which are not "killing" diseases but may be fatal indirectly by undermining health and so fostering or paving the way for other ailments.

The high incidence of parasitism is evidenced by the fact that of 1,093 patients attending one centre in the capital in 1949 there were 644 (58.9 per cent.) harbouring some form of parasite, and in 1950 of 1,551 there were 1,056 (68.0 per cent.) parasitized. For purposes of description the authors divide the parasites into four large groups: 1. Parasites of the blood and tissues, such as *Leishmania*, *Trypanosoma cruzi*, malaria and filaria. 2. Parasites of the intestine and "glandular adnexa", such as amoebiasis and many forms of helminthiasis. 3. Parasites of the urogenital system. 4. Parasites of the skin and ectoparasites generally.

The distribution of each of these and of each of their subdivisions, e.g., of *Taenia*, *Hymenolepis*, *Echinococcus*, *Enterobius*, *Trichuris*, *Ascaris*, *Ancylostoma* and *Necator*, are dealt with individually; to record these would need, not an abstract, but copying out almost the entire article.

To combat such a state of things it would be necessary to establish posts all over the country to determine statistically the local prevalence of the various infections, and to send out teams of sanitarians, clinician and laboratory technicians, for diagnosis and treatment of patients, and propagandists to instruct the adults, the schoolchildren and the adolescents in methods of prophylaxis—truly a counsel of perfection. *H. Harold Scott*

CROZES, M. La bilharziose vésicale au Maroc. [Urinary Schistosomiasis in Morocco] *Maroc Méd.* 1951, Aug., v. 30, No. 315, 726-7.

The author, from Casablanca, writes with over 20 years' experience of schistosomiasis in Morocco. He points out that the South Moroccan foci of schistosomiasis are to be found along the distribution of watercourses south

of the Grand Atlas which pass into the Sahara. There are, for example, foci at Tamgrout at the bend of the Draa in the west ; an infestation rate of 25 to 57 per cent. in areas near the centre (Oued Gheris and Ferkla) ; a focus at Erfoud, where a 20 per cent. infestation rate was found in 1929 ; and foci with rates of 5 and 20 per cent. respectively at Gourrama and Bou-Denib, to the east some 250 km. from the Algerian frontier. North of the Grand Atlas is the important focus at Marrakesh and between Tangier and Rabat is an isolated focus of Karia ben Aouda, some 10 km. from Souk el Arba ; here the index is between 37 and 87 per cent.

For the most part, the intermediate hosts are *Bulinus contortus* and *Planorbis metidjensis*, but the latter is rare. The infestation of *Bulinus* by cercariae in Marrakesh has been as much as 33 per cent.

The degree of human infection is very variable and apparently varies from year to year. In Marrakesh, the author has noted "schistosomiasis years". It is suggested that certain years are favourable to the "eclosion" of snails, as they are to the eclosion of insects. The water supplies to Marrakesh are described.

In conclusion, the author observes that schistosomiasis is less severe in Morocco than in Egypt and other parts of Africa. *H. J. O'D. Burke-Gaffney*

ANNECKE, S. & PEACOCK, P. N. B. **Bilharziasis in the Transvaal.** *South African Med. J.* 1951, Sept. 15 & 22, v. 25, Nos. 37 & 38, 676-80 ; 689-92, 1 fig. [21 refs.]

In this paper Drs. Annecke & Peacock working with the Malaria Unit of the Union Health Department, studied schistosomiasis in the Transvaal from several important aspects. Firstly, they investigated the distribution of molluscan hosts. They divided the Transvaal into four zones and found that *Bulinus tropicus* is found chiefly in the middle and western parts of the Transvaal which constitute the high-lying and more arid areas—where incidentally the lowest incidence of schistosomiasis occurs. *Physopsis*, on the other hand, though distributed throughout all areas, is found in larger numbers in the lower and wetter regions where schistosomiasis is at its worst, *i.e.*, the Eastern Transvaal. *Planorbis pfeifferi* was discovered in all the zones—mostly in the Northern and South Eastern districts.

The authors therefore regard *Bulinus tropicus*, if it is to be regarded as a vector of *S. haematobium*, as unimportant. They were moreover unable to infect this mollusc, or *Lymnaea natalensis* or *Pyrgophysa forskali*, also alleged to be vectors. *Physopsis africana*, however, is a very definite vector.

They also tested the efficacy of various molluscicides [which are not clearly defined in the paper] and their only really encouraging results under field conditions were obtained with copper sulphate. Much experimental work was required to determine the optimum concentration necessary to destroy freshwater snails without harming other desirable forms of life, or making the water dangerous for animals or plants.

They found that copper sulphate concentrations of 0.6 to 1 part per million were sufficient to destroy all snails in *standing* water, such as dams where the volume could readily be assessed. But in running water with a variable flow this was by no means so easy to determine, as it was impossible to calculate the volume of water and any variation in the flow. Under these conditions a concentration of at least 10-20 parts per million was needed to obtain satisfactory control.

They also exposed healthy snails to river water, which had been collected at varying intervals after a spraying with 1 part per million, and their survival time was noted. The percentage of snails left alive when exposed to river

water *immediately* after application of copper sulphate was nil after 15 minutes. When the snails were removed to fresh water after 1 minute of such exposure 50 per cent. were alive after 15 minutes, 23 per cent. after 30 minutes, 3 per cent. after 3 hours and nil after 6 hours.

When snails were added to river water, collected half an hour after application of the copper sulphate, 77 per cent. were alive after 15 minutes, 53 per cent. after 1 hour, 7 per cent. after 3 hours and nil after 6 hours. However, when the snails were added to water collected 1 hour after the application of copper sulphate, the percentage of survivors was much higher—after 6 hours 40 per cent. of the snails were still alive, and after 24 hours no less than 13 per cent.

On these findings, their suggested method of control is as follows :—

1. An initial application of 5 to 10 p.p.m. followed by weekly observations to determine when new snails appear.
2. When snails reappear, and not within 14 days, a second application is made—also of 5 to 10 p.p.m. It may take upwards of a month before the first of the new snail batch appears.

It is a waste of material to apply further copper sulphate before all spawn is hatched. If more snails appear, further applications are made, but the authors found that it was rarely necessary to treat any water more than three times. The copper sulphate is usually sprayed on the water surface with a knapsack-type sprayer. The whole procedure may be repeated two or three times a year.

No water must be left over and it is equally purposeless to treat a portion of a stream or valley, or even to treat one stream and leave out others in the vicinity—otherwise, there will be reinfection from untreated sources.

This work is still in the experimental stage and no large-scale control work has been undertaken—as the areas so far treated with copper sulphate were each selected as being representative of one particular set of conditions, and secondly their object was not to eradicate the snail populace, but to reduce it to below the transmission density.

Thirdly, they studied the distribution of *S. haematobium*, in African and European schoolchildren, their criterion of infection being the identification of viable schistosome ova in a single centrifuged specimen of urine collected after exertion. They found :—

1. With infectivity rates up to 80 per cent., urinary schistosomiasis is widely distributed among African schoolchildren in the Northern and Eastern Transvaal.
2. The incidence of schistosomiasis among European schoolchildren is much lower than among African schoolchildren.
3. The highest incidence is found in the North and North-Eastern Transvaal Lowveld and portion of the Western areas of the Northern Transvaal, with less in the intervening Highveld, where the disease is patchy.

The distribution of *S. mansoni* was not studied to any great extent. The authors stress that the distribution of schistosomiasis is considerably more widespread than that of the snail host, which is limited to its water sources.

The two papers are illustrated with one map and seven tables.

M. Gelfand

CAMAIN, R., NAVARRANNE, P. & AYITE, E. Deux Cas d'annexite à *Schistosoma haematobium* observés à Dakar. [Two Cases of Lesions of the Female Pelvic Organs due to *S. haematobium* in Dakar] *Bull. Méd. de l'Afrique Occidentale Française*. 1951, v. 8, No. 1, 57–64.

This paper consists of a record of two cases of bilharziasis of the female pelvic organs due to *Schistosoma haematobium* infestation. The first patient,

an African woman aged 34 years, suffered from a left-sided salpingitis and oophoritis, and there were superficial fibromatous lesions on the uterus; a subtotal hysterectomy afforded relief. The second patient, an African girl aged 13 years, was admitted for repair of an apparently simple and reducible right inguinal hernia; there were no symptoms of urinary or genital disorder. At operation a tumour was found in the right uterine appendage, which was removed.

In both cases the schistosomal origin of the lesions was established by pathological examination of the tumours, details of the histology being given, but in neither were ova found on search of the urine after operation.

[There is no reference to chemotherapeutic treatment of the schistosomal infection in either case.]

A. R. D. Adams

VÁZQUEZ GUZMÁN, D. Estudio sobre la bilharziosis, con exposición de una localización rara: en la arteria pulmonar y sus ramas. [**Schistosomiasis. Rare Localization of Ova in the Pulmonary Artery and its Branches**] *Med. Colonial*. Madrid. 1951, Oct. 1, v. 18, No. 4, 293-309, 8 figs. & 1 chart. [Numerous refs.]

The author states clearly at the beginning of this article that he intends to give merely a compilation of the literature and work on schistosomiasis, not to record anything new. He has, therefore, given a sketch of the discovery of *S. haematobium* by BILHARZ in 1852 and progress in our knowledge of it and its effects to the present day—its life-history, its diagnosis, its differentiation from other schistosomes, its vectors. The "rare localization" mentioned in the title receives no more than the statement that in the past 20 years at the Faculty of Medicine, Cairo, signs of lesions of the pulmonary artery and its branches due to ova of *S. haematobium* have been observed. No case details are recorded, merely that the condition can be recognized during life by X-rays and the clinical symptoms, the embolism of the smaller branches is caused by the ova, later dilatation and ultimately cor pulmonale. The lung parenchyma is not affected, or to a very slight degree only, and there is never any fibrosis. The right ventricle is hypertrophied. The condition has been designated Egyptian Ayerza's disease. The article ends with lists of the snail vectors of the different schistosomes infecting man.

H. Harold Scott

MESSENT, J. J. **Treatment of Urinary Schistosomiasis with Nilodin.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 127-9.

Seventy-two Africans, chiefly adolescent or adult males, passing *Schistosoma haematobium* ova in the urine were treated with nilodin. The gross dosage employed was 60 mgm. per kgm. of body weight in the first 22 cases; the next 50 patients received 75 mgm. per kgm. of body weight. In each series the drug was given in divided doses twice daily for 3 days; no toxic symptoms were observed. The morning urine from each patient was examined daily for a week from the beginning of treatment and then, as a rule, after the second and after the third week. The result was reported as negative if no ova or blood cells were found in the centrifuged deposit; if blood was found, or if the specimen antecedently examined contained ova, further examinations for ova were made.

By these standards the apparent cure rate 3 to 4 weeks after the first course of treatment was 52.6 per cent.; after the second, and larger, course it was 64 per cent. A table indicates the amount of drug given to individual patients, and records the presence or absence of eggs in the urine at the subsequent examinations.

A. R. D. Adams

NOR EL DIN, G. & DAWOOD, M. **Observations on the Side-Effects of Miracil D.** *J. Roy. Egyptian Med. Ass.* 1950, v. 33, No. 7, 688-93.

Twenty-three patients in Egypt with schistosomiasis were treated with high doses of miracil, 10 of them receiving a total of 8.4-9.8 gm., the average total dose being about 130 mgm. per kgm. with an average daily dose of 15-18 mgm. per kgm. The others received somewhat less. In 25 per cent. of the patients the blood pressure rose by 20 mm. Hg or less but fell again the next day. Thirteen patients complained of giddiness, two having severe vertigo when they tried to walk; these symptoms appeared on the second day and usually disappeared on the fourth. Anorexia occurred in 9 cases, vomiting in 9 (with haematemesis in 2), epigastric pain in 7, diarrhoea and colic in 3, insomnia in 5, and urticaria in one. Tremor of a fine type occurred in 2 patients. One patient developed severe myasthenic symptoms. No evidence was found of impairment of the hepatic functions. Twelve patients were examined by electrocardiogram and four of them showed inversion of the T wave. There was no toxic effect on the kidney. There was no permanent effect on the blood pressure, the initial fall lasting only 2-3 days. The blood count remained normal but there was a rise of percentage among the eosinophiles, possibly as a reaction against damaged worms.

F. Hawking

SOUIDAN, M. Z. A. **Miracil D, the New Anti-Bilharzial Treatment. Study of Toxicity—Antitoxic Action of Atropine.** *J. Roy. Egyptian Med. Ass.* 1950, v. 33, No. 7, 667-76.

Miracil was injected intravenously into 5 dogs. In the first dog under chloralose anaesthesia it caused tremors and twitchings, recovery of consciousness and transient fall of blood pressure with slowing of the heart. In a second dog the symptoms were similar; the blood sugar was normal or slightly raised, but the twitchings were much diminished if glucose was also injected intravenously. Further experiments suggested that the inhibitory effect of miracil on the heart is due to a central nervous mechanism since it was produced when miracil was injected into the carotid artery. Atropine can be given as an effective antidote for the action upon the heart.

F. Hawking

MACHADO, W. G. & MARTINS, C. Um foco autóctone de schistosomose no Pará. (Nota prévia.) [**A Focus of Schistosomiasis in Pará**] *Hospital. Rio de Janeiro.* 1951, Feb., v. 39, No. 2, 289-90.

In November 1949 a patient came to the hospital in Fordlandia, valley of Tapajós, Brazil, with dysentery, tenesmus, vomiting, rise of temperature and passage of muco-sanguineous faeces. Examination of the stools revealed abundant ova of *S. mansoni*. Others of the family were asked to attend and they were also found to be infested; further examination revealed 50 cases, the patients' ages ranging between 16 months and 56 years; 80 per cent. were children and 40 per cent. [only percentage figures are given] of them were born in Fordlandia and had never been away. Investigation of streams and irrigation canals revealed large numbers of Planorbidae, identified as *Tropicorbis paparyensis*, and many of them infested with cercariae. These facts have been reported to the Administration who will undertake an epidemiological investigation.

H. Harold Scott

VAN DER KUYP, E. **Notes on Planorbidae in the Netherlands Antilles.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, Sept., v. 3, No. 3, 283-4.

"In 1949 I reported the presence of *Australorbis glabratus lugubris* Wagner on Curaçao and Aruba, *Helisoma duryi intercalare* Pilsbry on Curaçao and *Tropicorbis isthmicus* Pilsbry on Curaçao and Bonaire.

"To these findings are added *Australorbis glabratus cristophorensis* Pilsbry on the Dutch part of St Martin and *Armigerus (Tropicorbis) decipiens* (C. B. Adams) on Curaçao."

STIREWALT, M. A., KUNTZ, R. E. & EVANS, A. S. **The Relative Susceptibilities of the Commonly-Used Laboratory Mammals to Infection by *Schistosoma mansoni*.** *Amer. J. Trop. Med.* 1951, Jan., v. 31, No. 1, 57-82, 3 figs. [14 refs.]

Eight different kinds of laboratory animals were exposed to infection with cercariae of a strain of *S. mansoni* from *Australorbis glabratus*, both of Porto Rican origin, with the object of ascertaining their relative susceptibility and suitability as experimental hosts. A detailed account is given of the procedure followed during exposure to infection and of the results of autopsies. Judgment of the suitability of the different hosts was based on certain considerations under which the animals are ranked in order, and this is summarized as follows :—

Percentage of schistosomes maturing : hamster, 31·8 ; mouse, 22·1 ; cotton rat, 17·2 ; guineapig, 6·4 ; cat, 10-45 ; white rat, 2·6 ; rabbit, 0-18 ; dog, 0.

Percentage fatality rate : dog, rabbit, cat, 0 ; white rat, less than 1 ; guineapig, 9 ; cotton rat, 12 ; mouse, 49 ; hamster, 71.

Ova in faeces : hamster, ++ ; mouse, cotton rat, + ; guineapig, cat, white rat, rabbit, dog, 0.

Length of mature worms : rabbit, cat, cotton rat, hamster, mouse, guineapig, white rat.

Ease of care and handling : mouse, white rat, hamster, guineapig, rabbit, cat, dog, cotton rat.

Ease of manual autopsy : mouse, hamster, white rat, cotton rat, guineapig, rabbit, cat.

For general laboratory maintenance of the infection, mice, hamsters and cotton rats are the most satisfactory, but each has its advantages or limitations which render it more or less suitable, as the case may be, for particular lines of investigation. For example, the hamster, with the highest percentage (31·8) of maturing schistosomes and the larger number of available eggs in faeces, is the obvious choice for maintenance of the parasitic strain, but its high death rate is a disadvantage. Cotton rats are especially suitable for study of the adult worms which are large and well-developed in this host. Mice are most suitable for chemotherapeutic studies, in which large numbers of infected animals are required. The similarity of the pathology in mice to that in the human host is also an advantage. For general immunological work as well as specific studies on methods of reducing their characteristic resistance to schistosome infection, rats are valuable hosts. The varying degrees of natural immunity in cats and rabbits and the different mechanisms of resistance which possibly occur in them offer scope for investigating the factors involved in the host selectivity of the parasite.

J. J. C. Buckley

SYMMERS, D. **Pathogenesis of Liver Cirrhosis in Schistosomiasis.** *J. Amer. Med. Ass.* 1951, Sept. 22, v. 147, No. 4, 304-5.

At autopsy in New York one French West Indian and four Porto Rican subjects were found to harbour schistosome ova in the liver. In two cases there was perilobular cirrhosis of the liver, in one there were patchy areas of interlobular cirrhosis.

A. R. D. Adams

RECIO, P. M. **Schistosomiasis and Malaria from the Surgeon's Viewpoint.** *J. Philippine Med. Ass.* 1951, May, v. 27, No. 5, 373-8.

The author has noticed that when ova of *Schistosoma japonicum* are demonstrable in the faeces, the vermiform appendix is almost invariably found on operation to be diseased. Two distinct clinical entities have been described—schistosomal appendicitis and appendiceal schistosomiasis. In the former, ova of the parasite block the vessels supplying and draining the appendix, so that obstructive gangrene takes place, manifesting itself as a sudden and violent attack of appendicitis; at operation the organ is found to be red, swollen, often gangrenous and studded with small nodules in which nests of ova can be demonstrated microscopically; ova are also present within the lumen of the appendix and in the faeces. In appendiceal schistosomiasis the ova have been found in the appendix without having produced any characteristic symptom or sign to distinguish them from ordinary cases of chronic recurrent appendicitis. Appendicectomy is indicated in these cases, as sooner or later the organ will become obstructed, with resulting gangrene.

Colo-rectal lesions of schistosomiasis can be diagnosed by sigmoidoscopy, especially after ulceration has occurred. Schistosomal granuloma in the rectum or in the ileocaecal region may resemble a malignant growth both clinically and radiologically; it should be resected as it is certain to cause intestinal obstruction sooner or later and may become the seat of malignant change. The relationship between cancer of the rectum and rectal schistosomiasis has not yet been determined, but the author has seen a case of rectal cancer (Grade II) in which ova of the parasite were demonstrable in the lymph nodes as well as in the growth itself.

Schistosome ova have been demonstrated at autopsy in the cerebral cortex and the author has diagnosed this condition clinically on several occasions. Hepatic cirrhosis is a common finding in the late stages and relief of symptoms by a spleno-renal or porto-caval anastomosis has been attempted in Manila, but without success by reason of the high operative mortality.

Schistosoma japonicum does not involve the urinary bladder primarily, but may do so by extension of a granuloma from the rectum.

The surgical differential diagnosis of malaria is also discussed briefly.

W. L. Harnett

SIMMONDS, W. L., MARTIN, W. E. & WAGNER, E. D. **Fresh-Water Cercarial Dermatitis from Southern California.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 611-13.

"1. Natural and experimental dermatitis have been produced by cercariae which emerged from the fresh-water snail, *Physa osculans* Haldeman, collected in Southern California.

"2. Three types of cercariae, differing in measurements from all previously described species, were found but their taxonomy will be considered in a future paper."

LIE-KIAN-JOE. **Some Human Flukes from Indonesia.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, June, v. 3, No. 2, 105-16, 12 figs. [22 refs.]

Post-mortem examinations in Djakarta were conducted to search the human intestines for Heterophyid trematodes. The contents of the whole length of the small intestine and also scrapings of the mucosa were examined with a binocular microscope. Only one species of Heterophyid was found, namely, *Haplorchis yokogawai* (Katsuta, 1932), but the search yielded four other trematode species of which two are described as new.

Haplorchis yokogawai.—This species, which is the most frequently encountered Heterophyid fluke in man in the Philippines, and is most frequently associated with heart failure, was recovered by the author from three post-mortems as follows :—(1) three specimens from a Chinese male, aged about 30 years ; (2) one specimen from an Indonesian male, aged about 40 years (autochthonous infection) ; (3) three specimens from an Indonesian male, aged 10 years (autochthonous infection). From a fourth post-mortem two specimens of *Haplorchis* were recovered whose species could not be identified owing to their bad preservation. In none of these cases was death due to heart failure and no eggs were found in sections of the heart muscles. The specimens are described in detail. The incidence of this species in man in Indonesia is unknown but these few cases occurred in a large number of autopsies, which suggests a low incidence. On the other hand these flukes are very small and difficult to find and may in fact be more frequent than is indicated by these findings.

Paralecithodendrium molenkampi n. sp.—The author recovered 19 specimens of this trematode from an Indonesian male of about 30 years of age. A single specimen had been found by MOLENKAMP two years previously in an Indonesian male, but the specimen was not described. The present material is described in detail and differentiated from other known species of this genus, most of which are parasitic in insectivorous bats. This is the first record of the genus as a human parasite. Certain abnormalities in some of the specimens suggest that man is an unsuitable host. The possibility of spurious parasitism is also discussed but the evidence appears to be against this.

Phaneropsolus bonnei n. sp.—Fifteen specimens of this trematode were recovered from the same man who harboured the previously described species, *P. molenkampi*. Other species of *Phaneropsolus* occur in birds and primates and *P. bonnei* is differentiated from these mainly by the position of the genital pore and the dimensions of the testes. This appears to be the first record of a species of *Phaneropsolus* as a human parasite.

Plagiorchis sp.—One specimen was obtained from the human host referred to above, and this constitutes the fourth record of *Plagiorchis* in man in Java. The specimen possessed a typical cirrus, a character which appears to differentiate it from other species, but a specific diagnosis is withheld on the grounds of insufficient material.

Plagiorchis javensis.—Two specimens were recovered from a Chinese and an Indonesian respectively, making a total of five records of this species in human hosts. This material has been reported upon in detail in a previous paper [this *Bulletin*, 1951, v. 48, 172].

J. J. C. Buckley

CHUNG, Huei-lan, HOU, Tsung-chang, HUANG, Ta-you & WENG, Hsin-chih.

Areca Nut (Betel Nut) and Oleoresin of Aspidium in the Treatment of Intestinal Taeniasis. *Chinese Med. J. Peking*. 1951, Jan.-Feb., v. 69, Nos. 1/2, 76-9.

Areca (betel) nut has been used in the treatment of tapeworm infection in China for 1,400 years.

In the present series there were 120 cases of tapeworm infection, 44 infected with *Taenia solium*, 67 with *Taenia saginata* and 9 with unidentified tapeworms.

Tapeworm eggs were found in the faeces in 53 cases and the segments in 43. [It is unusual to find the eggs in such a high proportion of cases.] Eosinophilia was found in 30 of 117 patients : the percentage was 3 to 5 in 21, and between 6 and 16 in 9. Of these patients, 19 also had *Ascaris* infection and of the latter only 4 showed an eosinophile count over 3 per cent. The youngest patient was three years old and the oldest 64 : over a third were between 21 and 30 years.

Sixty-five patients were treated with areca nut and 55 with Filix mas, either the extract or the oleoresin.

A decoction of the former was made by boiling gently thinly sliced areca nut in 500 ml. of water for about two hours until the decoction was reduced to 150 to 200 ml. Without preliminary treatment, except the omission of breakfast, the whole decoction is taken at 7 a.m. In the watery motion that usually follows within two hours the worm will be passed, but if there is no motion 50 ml. of 50 per cent. magnesium sulphate solution is given.

The routine for the administration of Filix mas is liquid diet for one day, followed by 50 ml. of 50 per cent. magnesium sulphate solution before any food is taken next morning, one hour later 2 ml. of extract or oleoresin is given followed by two further similar doses at half-hour intervals, and one hour after the last dose of Filix mas the magnesium sulphate is repeated.

The success of the treatment was indicated by the finding of the scolex. This was found in 32 of the 34 cases of *T. solium* infections treated with areca nut and in only 4 of 10 cases treated with Filix mas. In 26 cases of *T. saginata* infection treated with areca nut, the scolex was found in half the cases, and in 41 cases treated with Filix mas it was found in 11 cases. In the 9 unclassified it was only found once in a patient treated with areca nut.

The only untoward symptoms were nausea and vomiting in 4 patients taking areca nut decoction: in these cases the dose was repeated without further untoward reactions.

The authors consider that areca nut is the treatment of choice in tapeworm infection.

L. E. Napier

KOURÍ, P. & KOURÍ, Josefina. Diskussionen um *Inermicapsifer cubensis* (Kourí 1938). [Discussion on *Inermicapsifer cubensis*] *Ztschr. f. Tropen-med. u. Parasit.* Stuttgart. 1951, Oct., v. 3, No. 2, 243-53. [Numerous refs.]

The English summary appended to the paper is as follows:—

“The systematic location of *Inermicapsifer cubensis* and the priority of nomenclature are discussed. *Inermicapsifer cubensis* must be regarded as a right species.”

BEHRER, M. R. Hypereosinophilia with Eosinophilic Granuloma of the Liver associated with *Ascaris Infestation*. *J. Pediatrics*. St. Louis. 1951, May, v. 38, No. 5, 635-9, 3 figs. [Discussion: KLINGBERG, W. G., 639-40.]

MINISTRY OF AGRICULTURE AND FISHERIES. **Laboratory Methods for Work with Plant and Soil Nematodes** [GOODEY, T.] Technical Bull. No. 2, 25 pp., 2 diagrams & 16 figs. on 8 pls. [23 refs.] 1951. London: H.M. Stationery Office. [1s. 9d.]

SIMPSON, T. W. A Note on Filariasis among the Natives of Okinawa, with particular reference to possible Transmission of *Wuchereria bancrofti* by *Anopheles hyrcanus sinensis*. *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 614-16. [13 refs.]

The author refers to the literature on filariasis in Okinawa [see for example this *Bulletin*, 1940, v. 37, 650; 1948, v. 45, 453] and to some of the characteristic features of it. Nocturnal periodicity of microfilariae is high and the incidence of microfilaraemia between April and June 1945 varied from 10 to 30 per cent.; in general it was higher in rural communities. Elephantiasis is not common, but such lesions as chronic lymphadenitis and hydrocele are often seen: their relationship to filariasis is not proved.

The prevalent mosquito vector of filariasis in Okinawa is *Culex quinquefasciatus* [*fatigans*]: other species present in Okinawa have been shown to be effective intermediate hosts of *W. bancrofti* elsewhere and these include *Anopheles hyrcanus sinensis*. This anopheline has been cited as a vector in Hong Kong [this *Bulletin*, 1937, v. 34, 459] and in the Shanghai area. The author now quotes observations made in 1945 to suggest that *A. hyrcanus sinensis* may play a part in transmission of filariasis in Okinawa.

Refugees from the south had crowded into coastal areas north of the isthmus of Ishikawa, and by mid-July there was a rapid spread of communicable diseases, including malaria and other arthropod-borne infections. In the east coast village of Sedake numerous *A. hyrcanus sinensis* were found breeding: they fed voraciously at night on human beings. Dissection of 49 female mosquitoes of this species revealed the presence of filarial larvae in 4. Three of these showed larvae of 4-5 days' development and in the fourth a single mature larva was found in the proboscis. Dissection of 180 female *C. quinquefasciatus* showed 14 with filarial larvae. H. J. O'D. Burke-Gaffney

LAMPE, P. H. J. **Study on Filariasis in Surinam.** *Documenta Neerlandica et Indonesica de Morbis Tropicis*. Amsterdam. 1950, Sept., v. 2, No. 3, 193-208, 8 charts & 1 graph.

Examinations were made of 1,214 Negro mulatto residents of Paramaribo, Surinam, by means of night blood films, and microfilariae were found in 28.4 per cent. The youngest persons with positive findings were 18 months, and under 2 years old, respectively. The percentage of positives increased from 3 for ages 0-4 years, to 27 for the group 5-9 years. After that there was a gradual increase to 38 per cent. for the group 20-29 years old, and a slight decline in the subsequent age-groups. The group of 1,214 persons excluded persons with elephantiasis, but included 230 persons who had suffered from acute filarial attacks; in this latter group the microfilaria rate was 42 per cent. In 510 persons with elephantiasis the microfilaria rate was 8 per cent. The question is asked, how it is that exposure to infection is sufficiently great to produce microfilaraemia in about 30 per cent. of the children during the first decade of life, but continued exposure during subsequent decades leads to little further increase in the numbers containing microfilariae, in fact if elephantiasis develops the microfilaria rate diminishes? It is postulated that all persons probably become infected, but that an unknown principle prevents the normal development of the worms in about 70 per cent. of the adult persons who showed no signs of clinical filariasis, in 60 per cent. of those with acute symptoms, and in 90 per cent. of the cases with elephantiasis. Presumably the unknown principle is an antibody action, which has developed in persons exposed to infection, and attempts were made to imitate it by using antigen prepared from *Dirofilaria immitis* of dogs. This was injected into 80 children aged 6-10 years in order to stimulate the production of antifilarial immunity, and the development of filariasis in them, as compared with controls, will be studied in the coming years. [Incidentally, reference is made to a female *W. bancrofti* which was removed from the anterior chamber of the eye of a child 18 months old.]

Skin tests were also studied and were used to analyse the reactions of the community to filarial infection. The antigen was a saline extract of the dry worms, so that the final concentration was 1:4,000. Intradermal tests were performed by injecting 0.015 cc. intradermally which produced a weal 5 mm. in diameter. Observation was best made after 15-20 minutes. A careful study was made of the reactions in 200 persons to the intradermal injection of saline, diphtheria toxin and other non-specific substances. The *D. immitis*

antigen was then injected intradermally into 260 newly arrived Dutch soldiers. In 90 per cent. of these the size of the weal showed a normal distribution, the weals varying from 0-14 mm. in diameter, but the other 10 per cent. showed weals bigger than this. The test was then performed on 165 persons with microfilariæ; in them the weals varied from 6 to 27 mm. so that there was considerable overlapping with the control group. It is considered that a weal greater than 14 mm. indicates a positive reaction, but such a reaction is given by about 10 per cent. of uninfected persons such as the Dutch soldiers or people in Holland. In a second group of 195 Dutch soldiers who had lived two years at Paramaribo, the percentage of positive reactions was 17.9, and in a group of 30 soldiers who had been there 18-30 years it was 50. Other tests were made on 743 Negro and mulatto residents who showed no signs of filariasis and on 314 Hindustanis. An analysis of the results obtained is shown in the table.

Incidence of endemiological components	Per 100 of each age group			
	0-4 years	5-9 years	10-29 years	30 years and over
(1) <i>No symptoms</i>				
(a) Apparently not infected	91.3	5.0	3.0	2.3
(b) Primary negative phase	5.8	65.8	40.6	44.2
(2) <i>Primary microfilariæmia</i>				
(a) No symptoms	2.9	24.7	18.6	18.5
(b) Acute filariasis	0	2.4	13.0	8.5
(3) <i>Secondary microfilarial-negative phase</i>				
(a) No symptoms (concealed 1-b)	—	—	—	—
(b) Acute filariasis	0	2.1	15.8	17.3
(c) Elephantiasis	0	0	8.6	8.1
(4) <i>Secondary microfilariæmia (re-infection)</i>				
(a) No symptoms (2-a)	—	—	—	—
(b) Acute filariasis (2-b)	—	—	—	—
(c) Elephantiasis	0	0	0.4	1.1
TOTALS	100	100	100	100

The primary negative phase includes persons who have been invaded by filarial worms but there are no symptoms and no microfilariæ in the blood, probably because sufficient female worms have not encountered male worms and become fertilized. The secondary microfilaria-negative phase is the state where microfilariæ were previously present but they have later been destroyed by the host; at this stage the person presumably resists the maturation of further infective larvae for many years. The test appears to be specific for filarial infection; 50 children infected with *Ascaris* and similar worms were tested but none gave a response exceeding the arbitrary limit of 14 mm. in diameter. All the same, in view of the extensive overlapping with normal persons it is not possible to use the test for the diagnosis of clinical filariasis.

Microfilariæ other than *W. bancrofti* were never seen at the Civil Hospital of Paramaribo, but sheathless larvae (presumably *Mansonella ozzardi*) were found in 35 per cent. of Amerindians living in the interior. The distribution varied in different parts, from 6 to 75 per cent. of the native people being infected. Four cases of sheathless microfilariæ were also found in 200 day

bloods from Bush Negroes. In certain districts positive skin tests were obtained in 81 per cent. of the men, 65 per cent. of the women and 40 per cent. of the children aged 6-12 years. Allowing for the lack of complete specificity in the test, this probably indicates that all adult Indians in these parts become infected although they may show no symptoms and no parasites. The sex ratio is not very unequal, and infection probably takes place in the houses or fields rather than in the forest. *W. bancrofti* was presumably imported from Africa with the slave trade but *M. ozzardi* is probably native to America.

Hetrazan was given to some patients up to 6 mgm. per kgm. daily, subdivided into three amounts; on the first day only a total of 50 mgm. was given and the full dosage was reached gradually. Treatment was continued until 100-150 mgm. per kgm. had been given, which takes approximately 3 weeks. After this treatment, 40 out of 46 patients ceased to show microfilariae in the night blood. Three of the positive patients received further treatment for 8 days and became negative. One month later, 16 of the patients were re-examined and 8 showed a few microfilariae. Treatment was also given to 40 patients with elephantiasis but no microfilariae. In 11 of these there seemed to be an improvement in the symptoms. Side reactions were observed in 21 of the 46 patients with microfilariae, viz.: fever (15 cases), tender cord-like swellings resembling lymphangitis (13 cases), body pains (3 cases), testicular pains (2 cases), sleepiness (2 cases). None of these was sufficient to interrupt treatment. In 47 patients without microfilariae there were only 9 side reactions.

In order to produce an active immunity which theoretically might be attained by killing worms which might be present in the body, hetrazan was given for four weeks to 62 children aged 7-9 years, the total dose being 75 mgm. per kgm. Side reactions were not observed. A similar group of children served as controls. Before treatment, none of them showed microfilariae. Eight months later, 2 out of 52 treated children showed microfilariae as opposed to 4 out of 52 controls. The observations are being continued.

Ninety-four patients, 20 with microfilaraemia and 74 with elephantiasis, were also treated for 3 months with weekly subcutaneous injections of 50 mgm. piperazine. There was no effect on microfilaraemia or on clinical filariasis but the symptoms of elephantiasis improved in 29 out of 46 patients. [Some clinical improvement of elephantiasis often follows medical treatment of any kind.] There is a Negro belief in Surinam that the consumption of spices is a protection or remedy for clinical filariasis.

[This is a good and thoughtful paper which deserves study in the original by all those interested in filariasis.]

F. Hawking

JASWANT SINGH & RAGHAVAN, N. G. S. **Preliminary Studies on "Ex-Sheathing" of *Mf. bancrofti*.** *Indian J. Malariology*. 1950, Sept., v. 4, No. 3, 347-8, 4 figs. on pl.

ABE [this *Bulletin*, 1937, v. 34, 887] described the ecdyses of microfilariae of *Wuchereria bancrofti* in *Culex fatigans* as occurring (a) by a longitudinal tearing off of the sheath about its middle, and (b) through a cap formed at the anterior end. The present authors have noted similar forms of "ex-sheathing" in blood containing the microfilariae to which hetrazan had been added and which was kept under reduced atmospheric tension for some time and exposed to air thereafter.

Preliminary results are reported of experiments in which drops of blood containing microfilariae of *W. bancrofti* were taken at night and mixed with equal volumes of a hetrazan solution (100 mgm./100 cc. buffered saline) on slides. Controls were made with saline and blood only. One pair of specimens

was kept open and the other pair covered with coverslips ringed with vaseline. The microfilariae were alive and active, but in the morning it was noted that those in the sealed preparation containing hetrazan were markedly sluggish. Stained smears of these specimens showed that in the sealed preparation only were the microfilariae "ex-sheathing". This is illustrated in 4 photomicrographs. The experiments were repeated on other specimens with identical results.

Blood-hetrazan mixtures were also kept in Thunberg tubes and the air pressure reduced, after which air was admitted later. Stained smears made soon after showed the same phenomena as those found in the case of the sealed blood-drug preparation on slides. Identical results were obtained when the experiments were repeated.

Later experiments indicated that the minimum period required for the infected blood to be kept in contact with hetrazan, under reduced atmospheric pressure, in order that "ex-sheathing" of the microfilariae should occur on exposure to air was about 45 minutes.

The phenomena were not seen in the control blood specimens to which hetrazan had not been added.

H. J. O'D. Burke-Gaffney

SCHMID, E. E. & DASSANAYAKE, W. L. P. **Local Eosinophilia in Thick Drops around Microfilaria of *W. bancrofti*.** *Ceylon J. Med. Sci.* (Sect. D.) 1950, June, v. 7, Pt. 2, 62-5, 2 figs.

The observation of MAIER [this *Bulletin*, 1950, v. 47, 644] that eosinophile leucocytes accumulate around microfilariae of *Loa loa* and *Acanthocheilonema perstans* in thick drops was confirmed in Ceylon by these authors for the microfilariae of *W. bancrofti*. Using a simpler method of counting the cells than that of Maier, they found local eosinophilia around microfilariae in 81 per cent. of 52 cases, and in the majority of these (60 per cent.) the percentage of eosinophiles was greater in the areas about two microscopic fields distant from microfilaria than in areas closer to it. This is believed to invalidate a theory that the microfilaria secretes a substance which can induce eosinophilic morphology in neutrophile leucocytes *in vitro*, and favours the explanation that it is an attraction phenomenon.

J. J. C. Buckley

PUYUELO, R. & HOLSTEIN, M. M. L'onchocercose humaine en Afrique Noire française. *Maladie sociale*. [**Human Onchocerciasis in French Tropical Africa, a Public Health Problem**] *Méd. Trop.* Marseilles. 1950, May-June, v. 10, No. 3, 397-510, numerous illustrations. Bibliography.

This is a detailed monograph on onchocerciasis, with special reference to regions of French West Africa around the upper parts of the Volta river, *i.e.*, the Mossi country. It is not possible in this place to give more than an abstract of the new information relating to this particular region, which has recently been surveyed by mobile teams specially equipped for this purpose. In this part, onchocerciasis causes so much blindness that there is a Mossi proverb "nearness to streams eats the eyes". The chief foci are concentrated in the circles of Ouagadougou, Tenkodogo and Fada, while small foci have been reported along the white Volta in the Kaya area (2-5 per cent. infection rate). The region lies between 11° and 12° of latitude north and the altitude is 100-200 metres; the rainfall is only 0.8 metres. In Ouagadougou (population 548,000) samples indicate at least 9,000 persons infected; in Fada (population 212,000) probably 46,000 are infected; in Tenkodogo (population 220,000) 102,000 Africans have been examined, 17,600 of them carry nodules and 1,840 are blind. All the foci lie near the Volta or its tributaries. The people were

examined by palpation for nodules, and those with skin lesions have been studied in more detail; large numbers of persons with latent infections must have been missed by these methods. *Epidemiology*—Transmission is by *Simulium*. Since the small streams dry up during the dry season the only permanent breeding places are the Volta rivers themselves. Early stages of *S. damnosum* and *S. adersi* have been collected there in great numbers, usually attached to vegetation of non-specific types. But at one place, *Sphenoclea zeylanica* seemed specially to favour the larval stages. Adult flies were captured, with the use of children as bait. About 3 per cent. of those captured came to bite between 6 and 8 a.m. and almost all the rest between 4 and 6 p.m. The flies congregated among the vegetation at some distance from the banks of the river and avoided the banks themselves which are bare and sandy. About 97 per cent. of the bites were situated below the knee, and only 0.1 per cent. were above the waist. This may explain why the nodules are most situated below the waist also. Out of 320 flies dissected, 14 per cent. contained larvae in the "sausage" or infective stages.

Entomological prophylaxis is planned, but will require further information about the habits of *Simulium* in this region.

Clinical Study. Nodules.—In Tenkodogo the percentage for nodules is 43.4 for women, 31 for men and 25 for children of more than 5 years; in Po it is 48 for men, 36.5 for women and 15.5 for children. Usually nodules are multiple. As regards localization, 81.8 per cent. are placed low, *i.e.*, between the iliac crests and the knees inclusive, 15.8 per cent. are medium, *e.g.*, ribs and arms, and only 2.4 per cent. are high, *i.e.*, head and shoulders. However, in Po 12–19 per cent. are on the head, and ocular complications are more common there than elsewhere.

Cutaneous syndrome.—Among 59,250 Africans examined, there were 293 with skin lesions (0.4 per cent.) and 8,700 with ocular lesions (14 per cent.). The skin lesions varied from early inflammation to chronic thickening.

Ocular lesions.—Onchocerciasis causes blindness in Africa quite as much as it does in Central America. In the Volta region where the infection [? nodule] rate is 26.1 per cent., the rate for blindness is 2.6 per cent. and that for ocular lesions 12.2 per cent.; in a similar region with less onchocerciasis, the infection rate is 4.8 per cent. and that for blindness is 0.6 per cent. In certain villages the blind form 13–35 per cent. of the population. The lesions include optic atrophy and chorio-retinal damage of various types. Diagnosis depends on demonstration of the microfilariae in the eye by biomicroscope or ophthalmoscope, or examination of snips from the conjunctiva or skin.

Minor signs.—Lymph glands are often enlarged, especially in the groin; but it is not clear whether the enlargement is due to *Onchocerca*. Elephantiasis is rare and it also occurs in regions free from onchocerciasis; the authors consider that the causation of elephantiasis is complex and that possibly (but not certainly) onchocerciasis may be a predisposing factor. Arthritis is said to be caused but it was not seen by the authors. Hydroceles are frequent in the region of Diapaga, but 33 were examined by aspiration without microfilariae being found. The authors consider that the reports of microfilariae in the cerebrospinal fluid or causing cerebral symptoms are to be regarded sceptically.

Diagnosis.—In an endemic zone, it is always necessary to suspect onchocerciasis when there is any ocular trouble associated with skin disturbances. The diagnosis is confirmed by scarification of the skin and examination of the expressed juice for microfilariae.

Control of dissemination.—Attention is called to the possibility that onchocerciasis will be spread to new areas by soldiers or workers who carry the infection and it is advised that steps should be taken to prevent this by screening such

men, and by removing their infectivity by the administration of hetrazan and by excision of nodules.

Treatment.—The best therapy nowadays is by hetrazan and the authors have used it to treat 70 cases. Short case histories are given of all these seventy cases but the main facts have already been described elsewhere in this *Bulletin* [1950, v. 47, 484 ; 1951, v. 48, 182, 278]. It is considered that four courses should be given in a year.

In addition to the particular facts which have been reproduced above, this article gives detailed reviews of modern work on most other aspects of onchocerciasis, and there is a bibliography of 507 references, all of which will be found useful by workers on this disease.

F. Hawking

McMAHON, J. P. **The Discovery of the Early Stages of *Simulium neavei* in Phoretic Association with Crabs and a Description of the Pupa and the Male.** *Bull. Entom. Res.* 1951, Aug., v. 42, Pt. 2, 419-26, 4 figs. [12 refs.]

This paper describes the interesting story of the discovery in 1950 of the larvae and pupae of *Simulium neavei* in Kenya. The immature stages of this fly had, despite repeated searches by many workers in probable and improbable places, remained unknown since the adult female was first taken in 1911. That it must breed in river courses, like all known *Simulium* larvae and pupae, was confirmed in 1946 when treatment of certain river courses in Kenya with DDT eradicated the adults from the surrounding country. Renewed efforts to locate these larvae and pupae led to success finally early in 1950, when they were found attached to crabs *Potamon* (*Parathelphusa*) *niloticus*, living among the stones and rocks of sunlit cascades of the Kipsonoi River in Ngoina District, Kenya. This renewed search was inspired by the discovery elsewhere in Kenya that a phoretic association existed between *Simulium* larvae and pupae and mayfly nymphs. *S. neavei* larvae and pupae were found only on *P. niloticus* and not on two other species of crab in the rivers. It is probable that the distribution of *P. niloticus* along a river is more extensive than that of *S. neavei*, which, from adult catches, is limited between 4,300 and 6,000 ft. above sea level. The crab may also occur in stretches unsuitable to the fly on account of limited woodland on, or near, the banks of the river. About 50 per cent. of the crabs carried larvae and pupae ; as many as 10 larvae or 3 pupae were taken on a single crab ; they are found attached to the dorsum of the carapace and the basal segments of the legs. No very small larvae were seen ; it is presumed that direct contact of the ovipositing fly and the crab does not occur.

Two species of *Simulium* were taken on mayfly nymphs during this work. One resembled *S. copleyi* and the other is probably *S. lumbwanus*.

Identification of the *S. neavei* larvae and pupae depended upon breeding out adults from the material found on the crabs. About 70 per cent. success was obtained by removing pupae from the crabs and keeping them on damp lint in 3 in. × 1 in. corked, glass tubes. The paper provides the original descriptions of the pupa and male of *S. neavei*, including figures of the male terminalia and the respiratory organ of the pupa. The size and colour of the larva is noted, and a description of the female is included for reference.

The method for collecting the crabs and mayfly nymphs is described.

This phoretic association of *P. niloticus* and the immature stages of *S. neavei* not only resolves a long-standing problem but has a bearing on the application of DDT to rivers for the control of this important vector of onchocerciasis. It will now be necessary to treat only those rivers which are inhabited by the crab ; to guard against crabs escaping treatment by their mobility, simultaneous treatment of contiguous rivers and the confluence of rivers and their major

tributaries is indicated. There is evidence that the crabs need not be killed to ensure eradication of the fly, but, if an effective poison for the crab were found, this might be the easiest approach to permanent control.

D. S. Bertram

MAZZOTTI, L. **Observations on the Use of Hetrazan in Onchocerciasis in Mexico.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 628-32. [12 refs.]

Seventeen patients were treated with doses of 2 mgm. per kgm. hetrazan thrice daily for 1-4 weeks. The treatment was repeated up to 7 times in 2 years. Some were given 4-6 mgm. per kgm. Skin biopsies were taken twice weekly. The patients were observed in Mexico City away from chance of reinfection. At varying times during the next 2 years, 28 nodules were removed from these patients; 21 of these contained living worms and 7 contained only dead worms. In nodules from untreated patients it is usual to find dead worms in a greater proportion of cases. In some of the patients, the skin biopsies became positive again after having been negative for periods up to 8 months. Detailed histories of the 17 patients are shown graphically.

It is considered that hetrazan removes the microfilariae for a short time but it does not affect the adult worms in the nodules. The administration of the drug to individual patients is justified; but prophylactic use in endemic zones will achieve only limited success. To control the disease, it is necessary to attack the insect vectors.

F. Hawking

BURCH, T. A. & ASHBURN, L. L. **Experimental Therapy of Onchocerciasis with Suramin and Hetrazan; Results of a Three-Year Study.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 617-23, 2 figs.

Forty-four patients in Guatemala were given 6-8 intravenous injections of suramin, at a weekly dose of 20 mgm. per kgm., *i.e.*, 1 gm. for an adult, the total dose being 0.1 to 0.3 gm. per kgm. Twenty-eight patients were given 8 weekly oral doses each of 2-3 gm. for an adult, the total dosage being 0.3 to 0.5 gm. per kgm. Fifty-four patients were given hetrazan orally in increasing doses, beginning at 0.5 mgm. per kgm. and ending with 2-6 mgm. per kgm. 2-3 times a day. The treatment lasted 3-4 weeks and the total dose was 0.1-0.33 gm. per kgm. Twenty-nine patients were given both drugs simultaneously, namely, 1-7 weekly injections of suramin each of 1 gm. (total dose 0.03 to 0.2 gm. per kgm.) and hetrazan 1 mgm. per kgm. thrice daily by mouth for 4-8 weeks, the total dose being 11-78 mgm. per kgm.

Among the patients treated with suramin intravenously, 36 out of 42 were free from microfilariae after one year, 41 out of 43 were free after 2 years, and 10 out of 39 after 3 years. Suramin given by mouth had a definite but small effect upon the microfilariae. Hetrazan had a rapid action upon the microfilariae, and 50 out of 54 patients were free from microfilariae at the end of treatment; but the effect was only temporary, and after one year only 14 out of 46 patients were free from microfilariae. After 2 years only 1 out of 11 was free. The combination of the two drugs produced a rapid and permanent action upon the microfilariae; after 2 years, 25 out of 27 patients were microfilaria-free. However, the patients who received the combined treatment had rather light infections and it is considered that the combined treatment is not sufficiently better in its results than suramin alone to justify the extra trouble and expense.

Seventy-nine nodules were removed from these patients 3-6 months after treatment. Hetrazan caused only a slight damage (if any) to the adult worms. Suramin caused the death of most of the worms, thus explaining the permanent disappearance of the microfilariae.

The treatment recommended for onchocerciasis consists of intravenous injections of suramin. The first dose is 0.5 gm. for a 50 kgm. adult and the succeeding 7 doses consist of 1 gm. each. The toxic reactions occurring after suramin have been described previously [this *Bulletin*, 1949, v. 46, 855]. They include hyperaesthesia of the soles with fissuring or peeling, pruritus, and burning and redness of the eyes. Also fever, malaise and arthralgia, nausea, abdominal cramps, headache, etc., may occur.

F. Hawking

ERRATUM

In the abstract of the paper by ALICATA and RICCI entitled "Research into Trichinosis in Italy", published in this *Bulletin*, 1951, v. 48, 1033, the word "Volpino" in the third line should read "Bergamo".

DEFICIENCY DISEASES

SALCEDO, J., JR., REGALA, A. C., PASCUAL, C. R., SANTIAGO, L. C., INTENGAN, Carmen L., BAUTISTA, Alicia P., BOCOBO, Dulce L. & CONCEPCION, Isabel. **An Approach to the Problems of Malnutrition in the Philippines.** *J. Philippine Med. Ass.* 1951, July, v. 27, No. 7, 435-44.

STRANSKY, E., DAUIS-LAWAS, D. & LAWAS, I. **On Hypoproteinaemia due to Malnutrition in the Tropics.** *J. Trop. Med. & Hyg.* 1951, Mar., v. 54, No. 3, 53-60. [13 refs.]

"Plasma protein determinations in 150 children in the first years of life in the tropics show:

"(1) That hypoproteinaemia is rampant, 45 per cent of all cases having a protein level below the lowest limit of normal range.

"(2) That hypoproteinaemia is mostly due to hypo-albuminaemia. Out of 149 instances 130 cases have an albumin level below 4.5 and 113 below 4 grammes per cent.

"(3) The globulin level is rather high. There are only 48 cases below the level of 2 grammes; there are 43 cases with a level above 3 grammes and 63 cases with a level above 2.5 grammes per cent.

"(4) Hence the frequency of change of ratio in favour of the globulin. Out of the 149 cases 52 cases have an abnormally low ratio due to relatively high globulin and low albumin levels. There are, however, 51 cases with a very high ratio due to extremely low globulin levels.

"(5) Lability of the globulin-albumin ratio is a symptom of malnutrition. High ratio due to extremely low globular level is a symptom of exclusive prolonged milk feeding, either breast feeding or feeding with highly diluted condensed milk.

"(6) The association of hypoproteinaemia with other deficiencies as well as the clinical importance of hypoproteinaemia, hypo-albuminaemia, and hypoglobulinaemia are discussed."

STRANSKY, E., DAUIS-LAWAS, D. & VICENTE, C. **On Gamma-Globulin Levels in the Tropics.** *J. Trop. Med. & Hyg.* 1951, Sept., v. 54, No. 9, 182-5.

In continuation of previous work [STRANSKY, DAUIS-LAWAS and LAWAS, above] on plasma protein levels in the tropics, 141 hospital patients (117 children and 24 adults) have been examined. Gamma-globulin was determined in the plasma by the ammonium sulphate method.

The gamma-globulin levels are higher in the tropics than in a temperate climate. The levels are only slightly higher than Western standards in the first year of life but they continue to increase up to the age of about ten years, after which they become stabilized, whereas the total globulin levels continue to increase into adult life. The relatively high gamma-globulin levels are probably due (a) to infections developing in early childhood, which are very frequent in the tropics, and (b) to nutritional factors. *J. H. Birkinshaw*

DEVADAS, R. P. & SUTTON, T. S. **The Effects of Egg-Yolk Supplementation to the Poor Rice Diet of South India on the Growth of Rats. Part I. Fat-Extracted Egg-Yolk.** *Indian J. Med. Res.* 1951, Jan., v. 39, No. 1, 51-8, 2 graphs. [14 refs.]

"Experiments were conducted with young albino rats to study the effects on growth of supplementations of fresh and extracted egg-yolk to the 'poor rice diet of South India', used as the basal diet.

"1. The growth of rats on the basal rice diet was negligible, while the rats receiving supplementation of fresh egg-yolk showed striking increases in weight gains.

"2. Supplementations of crude casein, vitamin A and riboflavin to a diet already supplemented with fresh egg-yolk were not effective in producing further weight gains. The animals receiving just the basal rice diet, however, benefited from such supplementations.

"3. Exhaustive removal of fat from the egg-yolk by extractions with ether, acetone and alcohol, produced a corresponding diminution in the nutritive value of egg-yolk. Vitamin A by itself and in the presence of riboflavin seemed to correct most of the deficiency thus caused.

"4. The presence of some unidentified growth-promoting factors in egg-yolk is indicated by the difference in the results produced by the variously extracted egg-yolks."

DEVADAS, R. P. & SUTTON, T. S. **The Effects of Egg-Yolk Supplementation to the Poor Rice Diet of South India on the Growth of Rats. Part II. Egg-Yolk Extract.** *Indian J. Med. Res.* 1951, Jan., v. 39, No. 1, 59-62, 1 graph.

"1. Egg-yolk extract supplementation to the basal rice diet stimulated growth and food intake in rats.

"2. Egg-yolk extract supplementation to the basal rice diet made adequate in protein with vitamin-free casein and lactalbumin stimulated growth and food intake but led to the manifestations of deficiency symptoms on the skin.

"3. The addition of riboflavin along with egg-yolk extract to the basal rice diet made adequate in protein with vitamin-free casein and lactalbumin resulted in greater growth and normal appearance of skin.

"4. The presence of some unidentified growth-promoting factors in the egg-yolk extract is indicated by these results."

UNGLEY, C. C. **Vitamin B₁₂. Part 2. A Review of the Clinical Aspects.** *Nutrition Abstracts & Reviews.* 1951, July, v. 21, No. 1, 1-26. [Numerous refs.]

HAEMATOLOGY

CHAUDHURI, S. **Vitamin B₁₂ in Megaloblastic Anaemia of Pregnancy and Tropical Nutritional Macrocytic Anaemia.** *Brit. Med. J.* 1951, Oct. 6, 825-8. [19 refs.]

"Sixteen cases of megaloblastic anaemia of pregnancy and the puerperium were treated successfully with parenteral vitamin B₁₂.

"Out of five cases of tropical megaloblastic anaemia treated with vitamin B₁₂, four responded to vitamin B₁₂ and one responded better to subsequent folic acid therapy.

"Four micrograms of vitamin B₁₂ a day was the estimated requirement in mild cases of macrocytic anaemia of pregnancy and 10 μ g. in severe cases."

DICKMAN, S. R. & MONCRIEF, I. H. **Primary Amide Groups of Human Hemoglobin.** *Proc. Soc. Exper. Biol. & Med.* 1951, Aug., v. 77, No. 4, 631-3.

"The hemoglobin from sickle cell anemic individuals does not differ significantly in primary amide content from normal hemoglobin. Normal human hemoglobin was found to contain 26 primary amide groups per mole."

SINGER, K. **The Pathogenesis of Sickle Cell Anemia. A Review.** *Amer. J. Clin. Path.* 1951, Sept., v. 21, No. 9, 858-65, 1 fig. [38 refs.]

CHERNOFF, A. I. & JOSEPHSON, A. M. **Acute Erythroblastopenia in Sickle-Cell Anemia and Infectious Mononucleosis.** *Amer. J. Dis. Children.* 1951, Sept., v. 82, No. 3, 310-22, 3 figs. [Refs. in footnotes]

"Five cases of acute, transitory erythroblastopenia are reported. Four of these reactions occurred in patients with sickle-cell anemia leading to the development of an aplastic crisis, i.e., a precipitous and dramatic fall in red-cell count and hemoglobin levels. The fifth developed in a child with infectious mononucleosis and resulted in only minor alterations of the patient's hematological values.

"Acute erythroblastopenia is interpreted as representing a reaction on the part of the marrow to a variety of noxious agents. Its occurrence during the course of a *Salmonella choleraesuis* infection and in a patient with infectious mononucleosis is reported for the first time. The remaining three instances of erythroblastopenia developed in children with infections of the upper respiratory tract.

"The pathophysiologic aspects of such an acute cessation of red-cell production are briefly reviewed. The marrow picture, clinical course, and therapy of this syndrome are discussed."

RYAN, J. E. & FULLER, R. H. **Hemorrhagic Manifestations of Sickle Cell Disease.** *U.S. Armed Forces Med. J.* 1951, Apr., v. 2, No. 4, 623-33, 5 figs. [19 refs.]

When attention was first drawn to sickle cell disease (HERRICK, *Arch. Int. Med.* 1910, v. 6, 517), it was focussed on the anaemia, but it has since been appreciated that the disease may be encountered in its severest and often fatal form without anaemia being present.

Three cases are reported; the first was of a Negro male, aged 21, who had painless haematuria for two months. Cystoscopically, blood was seen coming from the right ureter. The blood picture was normal. As neoplasm or renal tuberculosis was suspected the kidney was removed. Serial section showed

no evidence of either of these conditions, but in formalin-fixed tissue the glomeruli showed capillaries dilated and packed with distorted red cells. The afferent arterioles and the tubular capillaries were stuffed with masses of conglutinated sickled red cells. The blood appeared to be escaping from the glomerular capillaries into the renal tubules on account of glomerular stasis.

Subsequently, examination of the patient's blood by direct smear showed no sickling and less than 1 per cent. of the red cells sickled in a sealed chamber after twenty-four hours.

The second case was that of a female Negro of 24 years. She was in the seventh lunar month of pregnancy when she developed severe epigastric pain, nausea and vomiting, and later, on admission to hospital, severe headache, difficulty in breathing, and upper abdominal tenderness in addition to the pain. The red cell count was within normal limits but the white cells were 21,000 per cmm. She showed blood in the urine and cerebrospinal fluid, and retinal haemorrhages, and the blood pressure, normal at first, rose to 242/150 mm. Hg. She became comatose six hours after admission and died.

At autopsy, as well as a large cerebral haematoma, small multiple haemorrhages were found in many other organs and tissues, including the muscles, the serosa, the endo- and myocardium, the lung, the intestinal mucosa, the liver, and the spleen. Sections of all the organs showed the capillaries and sinusoids stuffed with sickled cells; this was associated with interstitial haemorrhages. The placenta showed a similar condition, but the foetal blood in the vessels of the chorionic villi showed normal erythrocytes.

The third case was that of a male Negro of 18 years who complained of severe abdominal pain radiating to the lumbar vertebral region and legs, associated with tenderness in the abdomen and lumbar region.

The blood count was 3.9 million red cells per cmm. and 14,300 leucocytes. His temperature rose to 103.8°F, and he became irrational and died. Autopsy showed petechial haemorrhages of the serosa and mucosa and larger haemorrhages in the lung, bowel and spleen. Microscopically there was generalized capillary dilatation and engorgement with sickled cells.

A useful review of the literature follows, and the authors conclude as follows:

"In some patients hemorrhage may be the chief manifestation of sickle cell disease. Severe disease may be present without anemia. A high degree of suspicion of sickle cell disease is essential when a Negroid patient presents unexplained symptoms. Tests for sickle cell trait should be done on Negroes before induction into the military service."

L. E. Napier

BRUMPT, L. C. Hématies falciformes et anoxémie chez les cerfs. [**Sickle-Cell Anaemia and Anoxaemia in Deer**] *C.R. Soc. Biol.* 1951, June, v. 145, Nos. 11/12, 897-9.

VENOMS AND ANTIVENENES

DROGUETT DEL FIERRO, A., RAFFO, P., CABEZAS, J. & MORENO, J. Anemia hemolítica por picadura de araña. [**Haemolytic Anaemia resulting from a Spider-bite**] *Rev. Med. Chile.* 1951, Apr., v. 79, No. 4, 263-6, 1 fig. [20 refs.]

Two species of spider in Chile are regarded as venomous: *Latrodectus mactans* and *Loxosceles laeta*. The former is met with all over the country, especially in dry years and in the warm months, and is known vulgarly as "red belly" (*vientre colorado*) and is found beneath stones, in clefts and on fallow and sowed land; it produces symptoms mostly nervous. The latter is

found in old houses, on unpapered walls and on clothing hung on or near walls ; it produces local gangrenous spots and haemolysis with jaundice. In the case recorded here, the spider, though it was not identified, was almost certainly *Loxosceles*.

A man of 34 years, while carrying out his ordinary work, felt feverish and had severe shivering ; he had to leave his work and take to his bed. Some hours later he complained of severe pain in his left shoulder and there were signs of a bite ; very soon there was an area of oedema and an ecchymotic focus, followed by erythema of the chest, back, abdomen and inner aspect of the thighs. The next day there was generalized jaundice and he passed dark, mahogany-coloured urine ; the shoulder presented three gangrenous foci (well shown in a photograph). His temperature was 38.3°C. and there was a sparse petechial rash over the erythematous areas. There was albuminuria with hyaline and granular casts and some red corpuscles. Blood examination yielded red cells 2,300,000, Hb. 44 per cent., leucocytes 18,400 per cmm. Treatment consisted of blood transfusion, 3 litres being given altogether, with glucose and vitamins C and K. His condition returned to normal in 15 days. The mode of production of the haemolysis has not been clarified, but the jaundice is due in part to the haemolysis and in part to a "toxic hepatitis". Serum therapy gives excellent results, but it is not often available, because of the small amount of toxin obtainable for its preparation, "several thousands of spiders being required".

H. Harold Scott

SCHÖTTLER, W. H. A. **Toxicity of the Principal Snake Venoms of Brazil.** *Amer. J. Trop. Med.* 1951, July, v. 31, No. 4, 489-99, 3 figs. [20 refs.]

"The toxicity of 12 Brazilian and 10 nearctic and Asiatic snake venoms was examined in 1790 subcutaneous mouse tests.

"The mean lethal doses were determined by planimetric evaluation of the mortality curves in their whole lengths.

"Among the venom samples examined, those of the tropical rattlesnake (*Crotalus terrificus*) and the coral snake (*Micrurus frontalis*) were, with mean lethal doses of 0.0006 and 0.002 mg. per gram of mouse, the most toxic, whereas that of the much feared bushmaster (*Lachesis muta*), with a mean lethal dose of about 0.037 mg./g., ranged last.

"It is evident from the observations and considerations presented in this paper that there exists a marked variation among the individual venoms of the same species, and that even samples collected from a large number of specimens may vary widely from other venom batches obtained from the same species in the same way.

"With the exception of *C. terrificus* and *M. frontalis*, all the venoms here examined exhibited a very powerful local action, provoking extensive hemorrhage, gangrene and subsequent necrosis.

"Figures computed from the frequency of the species and the toxicity of their venoms indicate that the tropical rattler is by far the most dangerous snake in Brazil, but that the rôle of the second in place, *Bothrops jararaca*, is still important, whereas the combined total of the other species will only be responsible for less than five per cent of grave snake bite accidents in this country."

SCHÖTTLER, W. H. A. **Antigen-Antibody Relations in the Present Antivenin Production of Brazil.** *Amer. J. Trop. Med.* 1951, July, v. 31, No. 4, 500-509, 1 fig. [17 refs.]

"The therapeutic action of 11 Brazilian antivenins (2 polyvalent, 1 bivalent, 8 monovalent) against the venoms of 10 Brazilian snake species was assayed

in 2989 subcutaneous mouse tests, fixed antivenin doses being applied immediately after the injection of varying venom doses at the same site.

"The neutralizing effect was measured planimetrically by the area between the mortality curves obtained by venom alone and by venom+antivenin and expressed in milligrams and mean lethal doses.

"The more toxic venoms were better neutralized than the weaker ones, whereas the antivenins obtained by immunizations with the weaker venoms were more potent than the sera derived from the stronger venoms.

"A tentative heuristic theory is advanced, that the toxic principle in pharmacodynamically similar venoms is identical but not antigenic, and that the antigenic part of venoms is non-toxic.

"The titer of the antivenins is sufficient to cure average snake bites in this country, except those caused by the rattlesnake, but is often too low for severe cases. The local actions of the *Bothrops* venoms are not inhibited by the antivenins.

"Antivenin production in Brazil should be limited to two types: polyvalent against the species of *Bothrops*, *Lachesis*, *Crotalus*, and generically monovalent against the coral snakes."

BURNS, K. F. **Production of Polyvalent Antivenin against *Trimeresurus flavoviridis* and *Agkistrodon blomhoffii* Venoms.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 665-8. [16 refs.]

"1. Immunization of a horse with a mixture of *Trimeresurus flavoviridis* and *Agkistrodon blomhoffii* venoms resulted in the production of a highly satisfactory, potent polyvalent antivenin.

"2. The antivenin titers against both venoms were high and exceeded minimal acceptable potency standards.

"3. Seventy days were required for hypervenomization and the total dosage injected was 161.1 mgs. for each of the venoms employed."

SLOTTA, K. H. & PRIMOSIGH, J. **Amino-Acid Composition of Crotoxin.** [Correspondence.] *Nature*, 1951, Oct. 20, 696-7, 1 fig.

TROPICAL OPHTHALMOLOGY

TOULANT, P., LARMANDE, A. & TOULANT, M. Les conjonctivites folliculaires épidémiques à virus. Difficulté de leur diagnostic avec le trachome. [Difficulties in Distinguishing between Epidemic Follicular Conjunctivitis of Virus Origin and Trachoma] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 582-95. [29 refs.]

The differential diagnosis between acute follicular conjunctivitis (swimming bath conjunctivitis of Morax) and epidemic kerato-conjunctivitis on the one hand and trachoma on the other is discussed by the authors.

In countries where the incidence of trachoma is high, follicular conjunctivitis is often difficult to recognize. In follicular conjunctivitis the follicles preserve their red appearance, their firm consistency, do not break down into gelatinous granulations and disappear after a few months without treatment. No scarring of the conjunctiva or cornea results. Gelatinous granulations, granulations at the limbus, scarring of the cornea, Herbert's pits and pannus are indisputable signs of trachoma. The changes in the blood vessels as seen with the slit lamp are in practice often difficult to differentiate.

The two classical characteristics of acute follicular conjunctivitis are the presence of inclusion bodies in the epithelial cells and the absence of bacteria in the secretion but the inclusions are exactly similar in both diseases. In kerato-conjunctivitis the incubation period is short (5 to 8 days) and the onset is sudden. Enlargement of the pre-auricular gland and sometimes the sub-maxillary gland, marked conjunctival oedema with little secretion and superficial punctate or nodular keratitis occur.

The acute stage lasts about 15 days but the keratitis may last several months and up to a year and may cause permanent defects in vision.

In epidemics the corneal lesions are typical, but sporadic cases are easily overlooked.

Follicular conjunctivitis and epidemics of kerato-conjunctivitis are of particular importance near the coast and particularly in overseas countries. Acute follicular conjunctivitis occurs in Europe, all of Asia and Africa and it would appear that many of the epidemics of acute trachoma reported in the literature in the past were really epidemics of acute follicular conjunctivitis.

E. O'G. Kirwan

TOULANT, P., ROBINEAU, G. & PUYUÉLO, R. Les lésions du fond de l'oeil dans l'onchocercose africaine. [**Ocular Lesions of the Fundus in Onchocerciasis in Africa**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 615-25. [45 refs.]

Ocular lesions of African onchocerciasis involving the fundus of the eye were seen among infected patients examined in French Sudan and in Haute-Volta. Besides keratitis and iridocyclitis the authors found that choroiditis and optic nerve atrophy either combined or separate were quite common. The chorio-retinitis was characterized by the multiplicity and diversity of the lesions. The pigmentary lesions varied in their extent. Some were small, discrete and numerous while others were jet black and irregular in outline. Atrophic lesions similarly varied. Some showed large white areas surrounded by pigmentary lesions, others showed pale pink areas with retinal blood vessels running over them and others still showed small white spots resembling colloid bodies. All these different kinds of lesions were found together in the same individual.

In 31 patients suffering from onchocerciasis and complaining of visual defects the authors found 13 cases of optic atrophy of which 7 had no accompanying chorio-retinitis and 6 had a more or less extensive chorio-retinitis.

Optic atrophy is more often a late manifestation of onchocerciasis in cases in which skin nodules are numerous but it is also found in early cases in which nodules are few.

Examination with the ophthalmoscope in these cases showed no optic neuritis or thrombosis of the retinal blood-vessels and it has not been proved that the optic atrophy is a result of meningeal involvement and it is perhaps the result of invasion of the fibres of the optic nerve by the microfilariae. The authors point out the excellent results obtained with hetrazan in the treatment of 67 cases.

E. O'G. Kirwan

HEAT STROKE AND ALLIED CONDITIONS

HORNE, G. O. & MOLE, R. H. **Comparative Physiological Observations on Prickly Heat, Mammillaria and Anhidrotic Heat Exhaustion.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 79-90, 1 graph. [16 refs.]

In this paper the authors extend their interesting observations on anhidrotic heat exhaustion and related conditions among Europeans in India [this *Bulletin*, 1951, v. 48, 79].

They have shown that a raised sweat chloride is present in cases of mammillaria, and that rectal temperature is lower than normal after immersion for 20 minutes in water at 106-108°F. because of reduced skin conductivity. A high sweat pH, and a high skin temperature, a delay in diuresis after the ingestion of water and a prolongation of the antidiuretic action of pitressin have been found in anhidrotic heat exhaustion. In acquired anhidrosis there is an increase in cutaneous insensible perspiration.

[The possibility remains that the raised sweat chloride in mammillaria is associated with much increased output from certain 'fatigued' sweat glands which are hypersecreting in order to compensate for defective output from other glands. Rectal temperature may not truly reflect changes in deep body temperature over short periods, e.g., it shows normally a temporary anomalous fall after exposure to heat. The results of the immersion experiment should therefore be interpreted with caution.]

Many of the methods available are somewhat inaccurate and in view of the small number of cases (2 in each group), individual results or standard errors of the mean in all experiments would have enabled a better evaluation of the significance of these most important observations.] *M. L. Thomson*

TROPICAL ULCER

HUTTEL, W. A propos de la terramycine locale dans le traitement des ulcères phagédéniques. [**Local Terramycin in the Treatment of Tropical Ulcers**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 7/8, 427-8.

Three patients with tropical ulcers in Gabon were treated by curetting and the application of a firm dressing of a mixture of terramycin (5 gm.) and paraminophenylsulphamide (1162 F) [sulphanilamide] (100 gm.). In the first two patients, on the fourth and fifth days healing was well established and a protective dressing only was applied. Healing was complete in a month and 8 days respectively. The third more resistant case required 4 dressings and 2 curettings in the first 9 days, but healing was progressing by the 14th and complete by the 20th day.

C. J. Hackett

MISCELLANEOUS DISEASES

KAFFERO, E. D. **A Case of Rhinoscleroma.** *East African Med. J.* 1951, Aug., v. 28, No. 8, 315-17, 2 figs. on pl.

In this paper Kafero records a case of rhinoscleroma in a Uganda African male. He was admitted to the Jinja Hospital complaining of a painless ulcer

beneath his nose of at least two months' duration. It was of the indolent variety, extending from the nasal septum to the upper lip. Clean granulations covered the ulcer surface. On palpation, it was of an indurated rubbery consistency, painless with no tendency to bleeding. In addition ulcerative and extensive fibrotic lesions were present in the uvula and hard palate. In spite of a negative Kahn test in the blood, he was given a course of organic arsenicals and potassium iodide, but the disease remained unimproved.

A biopsy was then performed and the pathologist reported that the lesions were those of rhinoscleroma. A culture prepared from a scab revealed, in addition to a mixed growth of bacteria, the presence of *Klebsiella rhinoscleromatis*.

Penicillin given intramuscularly as well as locally was without benefit and the patient, up to date, remains uncured. The author believes this to be the first recorded case in an African. The paper is illustrated with two photographs, one showing the ulcer in life and the other the microscopic appearances of the lesion.

M. Gelfand

HALAWANI, A. **Endemic Diseases Control.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, No. 6, 347-58, 2 charts & 1 fig.

Malaria, schistosomiasis and ankylostomiasis are major endemic diseases in Egypt. The author advises co-ordination of effort in dealing with them by the formation of Endemic Diseases Units, one of which should be able after two years' work to rid 50,000 people of these endemic diseases and continue maintenance of the achieved standard of health. To this end an experimental area, Fayed, has been chosen; it is 7 kilometres long and 1 km. wide, lying between the Bitter Lake on the course of the Suez Canal and the sweet-water canal. (East and west of this narrow strip is desert.) Within this area malaria and schistosomiasis are to be controlled by destruction of mosquitoes and snails and by treatment of the reservoir of infection; in addition public bore-hole latrines are to be provided in the villages.

The author discusses the methods of snail survey and control; experience in Egypt has shown that despite efficient molluscicides, surviving eggs and fresh infestation from larger canals soon restore the snail population. In consequence the work of snail destruction by anti-schistosomiasis units in the past has not caused a decrease in the incidence of schistosomiasis, though the numerous treatment centres throughout the country have successfully prevented the dreaded complications of the disease. It is now believed that schistosomiasis is not so much an occupational disease as a disease of childhood; graphs illustrate this.

Malaria is to be dealt with by the use of residual insecticides and "single dose" mass treatment with chloroquine, camoquin, paludrine [proguanil] or mepacrine. Filariasis will be controlled by hetrazan treatment and the permanent closure of wells in which the vector, *Culex pipiens*, breeds. Likewise in the course of time the Endemic Diseases Unit will be able to deal with ankylostomiasis, ascariasis, taeniasis and fevers of the typhoid group.

R. Ford Tredre

PROTOZOOLOGY : GENERAL

LANDAU, A. Glandulär form av toxoplasmos hos barn. [**Glandular Form of Toxoplasmosis in a Child**] *Nordisk Med.* 1951, Oct. 17, v. 46, No. 42, 1575.

The English summary appended to the paper is as follows :—

“A case of acute glandular toxoplasmosis in a 9-year-old girl is reported. The Dye test was positive (1/4·000).”

See also p. 32, GIROUD, JADIN & REIZES, **Further Findings Concerning the Exanthematic Fevers with Ulceration or Tache Noire and the Toxoplasmoses of the Middle Congo.**

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

BOWEN, R. **Insects and Allergic Problems.** *Southern Med. J.* 1951, Sept., v. 44, No. 9, 836-41, 1 fig. [19 refs.]

This paper reviews the subject of insect allergy by providing a list of different types of arthropods concerned and discussing more fully some of the cases in the literature, and in the author's own experience, of allergy following contact with, or the bite or the sting of various arthropods. Indications are given of successful desensitization by antigen of persons seasonally hypersensitive to mosquito bites. The usual measures of control by the destruction of insect pests and the use of repellents are also recommended appropriately. There are comments on treatments exhibiting epinephrine, intravenous procaine hydrochloride, and benadryl, for severe cases of insect allergy. Antihistamine creams applied to the site of the bites were found to allay pruritus but only in the early stages of the lesion. The paper is apparently designed to draw the attention of practitioners in the southern States of America to the reality of allergic conditions initiated by arthropods and the means of dealing with them

D. S. Bertram

KÜHNELT, Wilhelm. Bodenbiologie, mit besonderer Berücksichtigung der Tierwelt. [**Soil Biology with special reference to Animal Life**] 368 pp., 63 figs. & 3 pls. 1950. Vienna : Verlag Herold. [23s.]

The medical entomologist is interested in the conditions of animal life in the soil because that is the environment of some of the stages of the insects which he studies : e.g., the early stages of *Phlebotomus*, pupae of tsetse flies, house-flies, etc., all stages, except larval, of *Trombicula*. The present work, which gives a general account of the biology of soil animals, would be useful to anyone studying these aspects of insect ecology. The book falls roughly into three parts. One deals with methods of collection and rearing of the animals that inhabit the soil, the second is a long systematic review of all the animal groups which have representatives in the soil fauna, from protozoa to mammals. A large part of this section deals with the soil insects and other arthropods. Finally, the author turns to the discussion of his facts and relates the soil animals to chemical and physical conditions of the soil, to the soil atmosphere and so forth.

Figures of the apparatus that may be used in extracting small creatures from the soil would have been valuable ; and it would have been helpful if reference had been given to the main sources of information on the physics and chemistry of the soil, though one recognizes that only the briefest account of soil science could possibly have been included. But on the whole, the subject appears to be dealt with adequately. The list of references, accumulated from a great range of sources, will be found very helpful.

P. A. Buxton

TAYLOR, L. R. **An Improved Suction Trap for Insects.** *Ann. Applied Biol.* 1951, Sept., v. 38, No. 3, 582-91, 2 text figs. & 4 figs. on pl.

KIRCHBERG, E. ; PETRI, K. Beiträge zur Kenntnis der Culicidae (Dipt.). *Aedes cataphylla rostochiensis* Martini, eine wichtige plageerregende Stechmücke in den Stadtrandgebieten Gross-Berlins [KIRCHBERG]. [**Contributions to the study of Culicidae (Dipt.) *Aedes cataphylla rostochiensis* Martini, a Troublesome Mosquito on the Outskirts of Greater Berlin**] *Ztschr. f. Hyg. Zool.* 1950, Jan., v. 38, No. 1, 1-5. II. Qualitative und quantitative Untersuchungen an Fiebermückenbrutplätzen in Gross-Berlin [KIRCHBERG & PETRI]. [**Qualitative and Quantitative Studies of Mosquito Breeding-Places in Greater Berlin**] *Ibid.* Oct.-Nov., Nos. 10/11, 289-326, 13 figs. [10 refs.]

The first paper points out that during the last 20 years *Aedes cataphylla rostochiensis* Martini has increased its numbers around Berlin considerably. Of the *Aedes* species previously considered typical of the low-lying parts of the Grunewald and the areas round the lakes to the north-west of the Grunewald, *Aedes cantans* and *Aedes meigenanus* are still found but *Aedes rusticus* and *Aedes communis* are very rare. The increase in the number of *Aedes c. rostochiensis* which make it a serious nuisance in the district is possibly due to the felling of trees due to the fuel shortage in post-war Berlin.

The second paper is a survey of the breeding places of anophelines near Berlin : 3,493 breeding places, mostly of *Anopheles maculipennis messeae*, have been found and these fall into several categories : of these, the most important are retainers of stormwater. Many new breeding places are directly or indirectly the result of the war. For example, in the Tiergarten district, bombing and the fuel shortage have removed the trees which formerly shaded the water. This, together with dumped army stores and the failure to keep ditches clear, has resulted in an increase in the anopheline population. The relation between the number of breeding places found, the numbers of the anopheline population, and of the human population, in each district, is discussed. Over the whole city there are 2,000 larvae to every 1,000 people. During the time of the study, the total number of larvae in each generation in Greater Berlin was about six and a half million.

J. H. Sudd

PAVIŠIĆ, V. O problemu komaraca molestanata u N.R. Hrvatskoj. [**The Problem of Pest-Mosquitoes in Croatia**] *Higijena.* Belgrade. 1951, v. 3, No. 3, 183-208, 11 figs. [15 refs.] English summary.

HADDOW, A. J., VAN SOMEREN, E. C. C., LUMSDEN, W. H. R., HARPER, J. O. & GILLET, J. D. **The Mosquitoes of Bwamba County, Uganda. VIII. Records of Occurrence, Behaviour and Habitat.** *Bull. Entom. Res.* 1951, Aug., v. 42, Pt. 2, 207-38. [27 refs.]

The work of Haddow and his colleagues in connexion with jungle yellow fever in Bwamba, Uganda, is familiar. It has continued for some ten years,

and certain sections have been published and abstracted in this *Bulletin*, particularly the work on such mosquitoes as *Aedes* and *Taeniorhynchus*, which seem particularly concerned with the transmission of the infection. Some 300,000 adult mosquitoes have been examined and large numbers of larvae, and the total number of species in this small area is 160, which is more than half the total mosquito fauna of East Africa.

The present paper calls attention to certain of the new species which have been described as a result of this work, and discusses variations in some of the groups which are particularly difficult to define or identify. It then gives a brief review of the 160 species, stating whether they are found in forest, plantations, lowlands, etc., and whether the males and females are commonly caught.

P. A. Buxton

MUSPRATT, J. **The Bionomics of an African *Megarhinus* (Dipt., Culicidae) and its possible Use in Biological Control.** *Bull. Entom. Res.* 1951, Aug., v. 42, Pt. 2, 355-70, 1 fig. [35 refs.]

An account is given of the biology of *Megarhinus brevipalpis* (Theo), based chiefly on insectary breeding of the species through several generations, over a period of 7 or 8 months. *M. brevipalpis* is widely distributed in Africa from the Cape to Kenya. The material of the present study was obtained from coastal sub-tropical forest in southern Natal, where the larvae are mostly found preying on larvae of *Aedes* spp. in the water which accumulates in leaf axils of *Strelitzia nicolai*. Larvae of *M. brevipalpis* were obtained in the field by exposing a jar, draped with *Strelitzia* leaves, and containing water from a *Strelitzia* leaf axil. It was found that adult females would not oviposit when kept in small cages, but would do so when released in the insectary. In the insectary, adults were fed on sugar solution, honey and fruit juices, and larvae on laboratory-bred larvae of *Aedes aegypti*.

In the study of the biology of this insect, special attention has been paid to its possible value in biological control of disease-carrying Culicine mosquitoes. The fecundity and rate of development seem to be superior to those species of *Megarhinus* with which biological control has been previously attempted.

The larva of *M. brevipalpis* will kill between 140 and 205 *Aedes* larvae in the course of its growth. When the temperature dropped (by accident) below 25°C., some of the larvae entered a state resembling diapause, during which they killed many *Aedes* larvae, but ate only a few. Pupation was in these cases delayed for several weeks. First instar larvae remained in the egg shell after hatching when the eggs were out of water but in a damp atmosphere. They survived for up to 6 days, which is the same length of time as larvae survived starvation in tap water. In water containing dead leaves, the larvae reached the third instar without Culicine food. Fourth instar larvae can survive out of water in a damp atmosphere for 3 to 4 weeks without food. Larvae of the same size will not usually attack one another but may attack smaller larvae, while large *Aedes aegypti* larvae will also attack small *M. brevipalpis* larvae.

The methods by which *Megarhinus* has been used in biological control are discussed.

A. J. P. Goodchild

REEVES, W. C. & RUDNICK, A. **A Survey of the Mosquitoes of Guam in Two Periods in 1948 and 1949 and its Epidemiological Implications.** *Amer. J. Trop. Med.* 1951, Sept., v. 31, No. 5, 633-58, 6 figs. (4 on 2 pls.). [36 refs.]

The island of Guam was surveyed for mosquitoes in 1942 and also intensively during the Pacific phase of the second World War. The surveys reported by the authors were undertaken partly because of the occurrence of an epidemic of Japanese B encephalitis in December 1947.

Of the mosquitoes taken in human dwellings, the great majority (99 per cent.) were *Culex fatigans*; but the most common species taken in diurnal human bait traps was *Aedes pandani*. In stable traps baited with various animals, *Aedes vexans nocturnus* was most common, followed by *Culex annulirostris marianae* and *Aedes pandani*.

A very large number of tests for the Japanese B virus gave only negative results, so that the authors are only able to speculate about the possible vector potentialities of these mosquitoes. *Aedes aegypti*, the principal vector of dengue fever in Guam in 1944, was exceedingly rare.

The authors note the presence (probably recent) of *Anopheles subpictus indefinitus* in Guam, but do not consider it a dangerous malaria vector as it was not found feeding on man.

Numerous collections of mosquito larvae were made and the species found were analysed according to the type of breeding place and their associations with other species. Some forms, such as *C. fatigans*, *Aedes albopictus* and *Aedes guamensis* were particularly prevalent in man-made breeding places, either "domestic" (in association with houses) or in piles of discarded war equipment. Such breeding places constituted 58 per cent. of all the larval sites discovered. The high proportion of this type of breeding place points to elimination of such foci as a control measure, should this be necessary. Probably the near disappearance of *Aedes aegypti* was due to vigorous campaigns against domestic breeding sites in 1944-5. Elimination of discarded receptacles and coconut shells which collect water and provide breeding sites is the most feasible way of reducing several of the mosquito species. J. R. Busvine

SASA, M. & ISHIMURA, K. **A New Species of Mosquito, *Aedes* (*Finlaya*) *bunanoki*, n. sp. : from Aomori, Japan.** *Japanese J. Exper. Med.* 1951, Apr., v. 21, No. 1, 103-8, 5 figs. [10 refs.]

SASA, M. & KANO, R. **Description and Comparative Studies on the Larva of *Aedes* (*Stegomyia*) *galloisi* Yamada. (Diptera, Culicidae.)** *Japanese J. Exper. Med.* 1951, Apr., v. 21, No. 1, 109-13, 3 figs.

BARNETT, H. C. & TOSHIOKA, S. **The Bloodsucking Insects, Mites and Ticks of Korea and their relation to Disease Transmission.** 25 pp. [61 refs.] [1951] Japan Logistical Command. Prepared by 406th Med. Gen. Lab. APO 500.

This paper consists chiefly of a list of 135 species of bloodsucking arthropods so far recorded from Korea in Japanese and other literature. The list is accompanied by brief notes on distribution, biology and relation to disease. The paper contains no original work.

The arthropod-borne diseases recorded in Korea are malaria, murine typhus, epidemic typhus, Japanese B encephalitis and louse-borne relapsing fever. *Anopheles hyrcanus sinensis* is probably the only vector of malaria. The rôle of mosquitoes in filariasis transmission in Korea is not yet established. Medical reports have not distinguished between flea-borne and louse-borne typhus, but *Xenopsylla cheopis* and *Pediculus humanus corporis* are common. *Culex tritaeniorhynchus* is abundant and may play a part in the epidemiology of Japanese B encephalitis. Relapsing fever appears to be transmitted by the body-louse as tick-borne relapsing fever has never been reported.

Other arthropod-borne diseases which may occur are kala azar, scrub typhus and Russian spring-summer encephalitis. Plague, although occurring in China and Manchuria, has never been reported from Korea. *H. S. Leeson*

See also p. 73, McMAHON, **The Discovery of the Early Stages of *Simulium neavei* in Phoretic Association with Crabs and a Description of the Pupa and the Male.**

NASIRUDDIN, M. *Phlebotomus argentipes* found in Shimoga District, Mysore State. *Indian Med. Gaz.* 1951, Apr., v. 86, No. 4, 142-5, 4 figs. (maps.) [18 refs.]

In connexion with an irrigation scheme in Mysore State, involving the construction of a large dam across the R. Bhadra, and a system of canals, a survey of existing health, economic, and agricultural conditions was carried out in the areas to be irrigated. The object of the survey was to suggest ways of minimizing the ravages of malaria after the advent of the canals. In the area served by the "Left Bank Canal" the population is scanty, and the villages small and in bad repair. During the search for anophelines, *P. argentipes* was found in the cattle sheds, on or near the damp, urine-saturated floor. Most of the other Indian records of *P. argentipes* are associated with kala azar, but a survey of children did not reveal the disease in this district. Immigration of labour to new industrial plants presents a danger that kala azar may be introduced. *A. J. P. Goodchild*

HOFFMAN, R. A., LINDQUIST, A. W. & BUTTS, J. S. **Studies on Treatment of Flies with Radioactive Phosphorus.** *J. Econom. Entom.* 1951, Aug., v. 44, No. 4, 471-3.

This paper deals with the radio-active "tagging" of flies for field studies. The scope and conclusions are essentially the same as those of JENSEN and FAY [see this *Bulletin*, 1951, v. 48, 1153], of which work the authors do not seem to be aware. Useful additions in the present work are considerations of the adverse effect of food containing radio-active phosphorus on the fertility of the flies, and of the distribution of P³² in the various organs of the dissected fly. *A. J. P. Goodchild*

LAL, B. N. & SRIVASTAVA, S. B. **Control of Fly Breeding in Composting. I. Effect of Chemicals on Fly Breeding.** *Indian J. Agric. Sci.* 1950, June, v. 20, Pt. II, 239-50.

The Bangalore process of composting is in common usage in India for the disposal of faecal and refuse waste matter. Fly breeding is greatly minimized in an ideal medium by the development of a high temperature in the compost trenches, which kills maggots. Any factors, such as season or rainfall, which lower this temperature will favour the development of maggot to adult fly. To overcome this difficulty chemicals may be used in the original layering of waste matter into the compost trenches. Experiments are described to determine which chemical of the following was the most effective: lime, borax, wood ash, DDT, Gammexane or bleaching powder. Results were measured by the number of flies which emerged from an inoculum of 1,000 maggots in each prepared medium; the average numbers of maggots already present in each sample of medium used was determined at the same time in control experiments. Borax proved to be very much more effective than the rest; bleaching powder and lime were surprisingly ineffective. Statistical analysis confirmed the

results. In practice, therefore, a layer of earth-borax mixture 1 inch thick is applied over the complete surface of the top layer of refuse ; the proportion of borax to earth is 1 to 10.

[The authors do not quote a critical temperature in the compost mass below which it is necessary to use the chemical insecticide ; 60°C. or higher is mentioned as of common occurrence for summer and dry winter months in the compost trenches ; 46°C. is fatal to maggots and the favourable temperature for their development is around 32°C.]

R. Ford Tredre

BUSVINE, J. R. **Mechanism of Resistance to Insecticide in Houseflies.** *Nature*, 1951, Aug. 4, 193-5, 2 figs.

It has often been assumed that resistance to DDT is of the same nature in different strains of house-flies. This paper shows that this is not so in two strains, one of which came from Italy and the other from Sardinia.

When allowed to walk over a DDT deposit, the Sardinian flies were "knocked down" readily, but recovered when removed from the treated surface. Flies of the Italian strain, on the other hand, were resistant to "knock-down". When DDT was applied, or injected into the thorax, flies of both strains were about equally resistant.

There was a definite relationship between the rate of dehydrochlorination of DDT analogues and toxicity in the Sardinian strain. Compounds which did not release hydrogen chloride very readily were more toxic to the Sardinian flies than to the Italian. Both strains tolerated analogues with a high rate of dehydrochlorination *in vitro*. The author suggests that both strains may owe their resistance to dehydrochlorination mechanisms which act differently, that of the Italian strain being more efficient on analogues which are difficult to hydrolyse *in vitro*. This Italian strain, however, is resistant to DDT and pyrethrins, but not to other chlorinated insecticides, whereas the Sardinian strain is resistant to a number of chlorinated hydrocarbon insecticides. The resistance to "knock-down" shown by the Italian strain is not due to a more rapid dehydrochlorination, since it has been found to metabolize DDT slowly. Although the dehydrochlorination mechanism plays some part in DDT resistance it cannot account fully for the phenomenon.

The importance of the DDT solvent used in DDT resistance tests in which the insecticide is applied directly to the thorax of the fly is also stressed. The apparent resistance of a strain was much greater with DDT in acetone than with DDT in oil.

It is suggested that this difference is due to the evaporation of acetone and the subsequent crystallization of DDT so that there is only a small reservoir of DDT in the cuticle wax. With a solution of DDT in oil, the thorax of the fly is covered with an oil film saturating all the tissues and forming a reservoir which is drawn upon as the DDT is metabolized internally.

C. Mary Harrison

MISSIROLI, A. Resistenza agli insetticidi di alcune razze di *Musca domestica*. [**Resistance of Strains of *Musca domestica* to Insecticides**] *Riv. di Parassit.* Rome, 1951, Jan., v. 12, No. 1, 5-25, 8 figs. [15 refs.] English summary (7 lines).

The author surveys the whole problem of DDT-resistance in the house-fly. In Italy 3 strains of house-flies can be distinguished. Some strains are susceptible to DDT, others DDT-resistant, and yet others are resistant to chlordane. DDT-resistance was shown to be inherited and the character for non-resistance was dominant over that for resistance in house-flies taken from the Province of

Latina. Flies of this strain, although resistant to DDT, were susceptible to chlordane, dieldrin, and methoxychlor. It is suggested that such a race probably arose from a few individuals in the population which were already capable of resisting DDT and which were no longer subject to competition with susceptible flies, as soon as DDT was used. With the widespread use of chlordane to control DDT-resistant flies, there have arisen strains which are highly resistant to chlordane, and to a lesser degree to DDT and other chlorinated hydrocarbon insecticides.

C. Mary Harrison

MOSNA, E. Sulla resistenza delle mosche domestiche al Chlordane. [**Resistance of House-Flies to Chlordane**] *Riv. di Parassit.* Rome. 1951, Jan., v. 12, No. 1, 27-36, 6 figs. English summary.

In May 1950 there were reports from Sardinia of house-flies resistant to chlordane. This insecticide was used successfully in 1948 and 1949 against DDT-resistant flies in the Province of Latina, Italy, where the insecticide was still effective four months after the end of spraying. During the summer of 1950, however, it became evident that house-flies in this part of Italy were resistant to chlordane also. After precisely the same treatment of chlordane as in previous years there was an increase in the numbers of flies just one month after the end of treatment. It was noticeable that resistance did not occur all over the province equally, but that there were focal points in scattered areas. The author suggests that after the first year of spraying a few resistant flies remained, and that this population was diluted by sensitive flies from outside the sprayed area, but by the third year the resistant character was much more diffused throughout the population.

C. Mary Harrison

PAL, R. **DDT Resistant Strain of *Musca nebulosa***. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 125-6.

There are few reports of house-flies, other than *Musca domestica*, showing a resistance to insecticides. In spite of the wide use of DDT in India since 1945, there have been no definite reports of DDT-resistance there.

Flies (*Musca nebulosa*), taken from 3 different localities which had been sprayed with DDT regularly for four years, were reared in the laboratory for one generation and the progeny were tested for DDT-resistance. There was no evidence of resistance from the rate at which paralysis occurred when flies were exposed to a DDT deposit on glass.

Selection with DDT over 12 generations did not give rise to a really resistant strain. At the third generation, flies were 1.6 times as resistant as a normal stock, but no further increase in the resistance was observed.

C. Mary Harrison

PIMENTEL, D., DEWEY, J. E. & SCHWARDT, H. H. **An Increase in the Duration of the Life Cycle of DDT-Resistant Strains of the House Fly.** *J. Econom. Entom.* 1951, Aug., v. 44, No. 4, 477-81, 1 fig.

Few careful observations of the length of life cycle of DDT-resistant and susceptible flies have been made. The length of life cycle of 5 strains of house-flies, one susceptible, one highly DDT-resistant, and 3 with intermediate resistance were compared in the laboratory.

The egg stage was of similar duration in all strains, with the peak of hatching occurring at 11 hours. The length of the larval stage, and the span of time for all the larvae to pupate differed with the degree of resistance shown by the strain. The most resistant strain had a longer larval period than the

susceptible strain, and strains with similar degrees of resistance had similar larval periods. Moreover, flies which emerged from the first pupae of a culture were more susceptible to DDT than flies from later pupae.

There were no significant differences in the weights of pupae from susceptible and resistant strains, the length of the stage, the percentage emergence, or the peak of emergence. The differences in the sex ratios, length of life, pre-oviposition period, and the average numbers of eggs laid by adults of susceptible and resistant strains were negligible.

The increased length of larval life shown by the highly resistant strain would result in fewer generations of flies in a given period than in a susceptible strain.

C. Mary Harrison

SUMERFORD, W. T., GOETTE, Mary B., QUARTERMAN, K. D. & SCHENCK, S. L.
The Potentiation of DDT against Resistant Houseflies by several Structurally Related Compounds. *Science*. 1951, July 6, 6-7.

Recently there have been a series of reports of substances acting as synergists with DDT against DDT-resistant house-flies. The authors describe investigations on DDT analogues as synergists. Of eleven analogues tested 1,1-bis(p-chlorophenyl)-ethanol (DMC) was outstanding : considerably higher kills of house-flies were obtained with mixtures of 100 parts of DDT and 10 parts of DMC than with DDT alone, but the percentage kill did not increase appreciably by increasing the proportion of DMC in the mixture up to 50 per cent.

Residual applications of 200 mgm. of DDT and 40 mgm. DMC per sq. ft. did not give encouraging results against resistant house-flies in the field, but a water emulsion of 5 per cent. DDT and 1 per cent. DMC used as a mist space spray was very effective against the same DDT-resistant flies.

C. Mary Harrison

GARRETT-JONES, C. **The Congo Floor Maggot, *Auchmeromyia luteola* (F.) in a Laboratory Culture.** *Bull. Entom. Res.* 1951, Apr., v. 41, Pt. 4, 679-708, 9 text figs. & 2 figs. on pl. [39 refs.]

The author has maintained a strain of *Auchmeromyia luteola*, the Congo Floor Maggot fly, for two and a half years in a London laboratory. The culture was established from larvae sent from Africa. The method of cultivation is described and there is a good deal of experimental work demonstrating the effects of temperature, humidity, and diets on different stages of the insect. These results are considered in relation to the varied conditions which, from a review of the fly's distribution in Africa, must influence this insect in nature. Apart from a record for the Cape Verde Islands, it is restricted to Africa from about the latitudes 18°N. and 30°S. and between the west and east coast. There is, in addition, a record for the Sahara belt at Air. The species ranges from sea level to 7,500 ft. above sea level ; the general climate may be dry or wet ; the larva is an obligatory, intermittent, blood-sucking parasite of man, particularly associated with territory where the people sleep on the earth floor of their huts and houses. It is not certainly established that this species breeds in wart-hog burrows or, indeed, on any host other than man.

In culture, the sex ratio was near unity and unaffected by the different conditions of rearing studied. Females lived up to 93 days and males for 85 days. Human or simian faeces appeared to be an important constituent of a variety of foods supplied to the flies. Mating was persistent and prolonged. One male can fertilize several females ; crosses between flies reared from larvae sent from different parts of Africa were successful. The first batch of eggs was laid about 2-3 weeks after emergence and consisted of about 54 eggs. These

were laid in dry sand in preference to sand damp with urine or dry after being so contaminated. A cloth on the sand rarely had eggs on it. As many as five further egg batches, smaller than the first batch, were observed. Eggs hatched in 36-60 hours at 26-28°C. and 50-60 per cent. R.H., but were delayed for 3-7 days at 10 per cent. R.H. Larvae were kept on dry sand in glass pots and were fed at least twice weekly on the author's leg. This was the most successful larval diet. One strain was maintained for three generations on guineapigs as hosts. The larvae succeeded in feeding from free blood absorbed on filter paper but with limited success in development. Most of the experimental work deals with larvae fed twice or four times a week on the human host and kept at temperatures of 23°C., 28.5°C. and 34°C. combined with relative humidities of 90 per cent. or 10 per cent. It was found that larvae could ingest two-and-a-half times their weight of blood; large larvae engorged in about 20 minutes. They would feed daily if opportunity were offered. The greater the frequency of meals the greater was the rate of growth, and moulting and pupation were then related to weight attained. Unfed first-stage larvae weighed 0.22 mgm. and moulted at weights between 1.5 and 2.1 mgm. and again when 12-19 mgm. after, respectively, two or three meals, and the fourth and seventh meals. Pupation never occurred below 97.5 mgm. and was observed after 17 larval meals and within 26 days of the larva emerging from the egg.

One-hour exposures to 42.5-43.5°C. were lethal to third-stage larvae; this was not affected by humidity. At 28.5°C. and 90 per cent. R.H. first-stage larvae, if unfed, survived for 9-20 days; after one and two meals they lived 8-21 days and 14-21 days respectively. Third-stage larvae just after moulting to this instar survived for 17-18 days; they survived 28-47 days if about ready to pupate. Loss of weight was greater and survival time shorter at the lower humidity of 10 per cent. R.H.

Underfed larvae (meals twice a week) moulted and pupated at lighter weights than well-fed larvae (four meals a week) and resulted in lighter adults.

The pupal stage was little affected by humidity and survived 9 days at 34°C., 11 days at 28.5°C., and 15-16 days at 23°C.

The life cycle in nature at 25°C. is estimated on the basis of these experimental findings to be as follows: first-stage larvae feed three days after hatching; on the assumption that a blood-meal is obtained four times a week, the larval and pupal stages would be completed and the flies emerge in about 46 days. Eggs would be laid about 21 days after emergence to complete the cycle from egg to egg in about 10 weeks. Five generations would be possible in a year.

There is a map showing the known distribution of the fly in Africa. Photographs illustrate the larva while feeding, and showing a characteristic constriction when disturbed in their sandy environment.

[This paper not only adds a great deal of new information about this fly to a sparse literature on its distribution and habits in nature, but endeavours, with considerable success, to interpret the laboratory findings in terms of physiological principles. It deserves to be read in the original.]

D. S. Bertram

KANO, R., SATO, K. & TANGE, H. **Notes on the Flies of Medical Importance in Japan. (Part II.) The Larvae of Sarcophaga known in Japan.** *Japanese J. Exper. Med.* 1951, Apr., v. 21, No. 1, 115-31, 63 figs.

KANO, R. & SATO, K. **Notes on the Flies of Medical Importance in Japan. (Part III.) Larvae of Calliphorini in Japan.** *Japanese J. Exper. Med.* 1951, Apr., v. 21, No. 1, 133-40, 21 figs.

BRUCE, W. N. **Studies on the Biological Requirements of the Cat Flea.** *Ann. Entom. Soc. of America.* 1948, v. 41, No. 3, 346-52.

WHARTON, G. W., JENKINS, D. W., BRENNAN, J. M., FULLER, H. S., KOHLS, G. M. & PHILIP, C. B. **The Terminology and Classification of Trombiculid Mites (Acarina : Trombiculidae).** *J. Parasitology.* 1951, Feb., v. 37, No. 1, 13-31, 8 figs. [45 refs.]

This useful and important paper is the outcome of a conference held at the Rocky Mountain Laboratory, Hamilton, Montana, U.S.A., in July 1948. In it are listed and illustrated the characters which should be used in descriptions of larval and adult Trombiculids together with glossaries of terms for both. There are also keys for the identification of sub-families, genera and subgenera based on larval characteristics and a key to the genera based on adult characteristics.

Some nomenclatorial problems are discussed and it is hoped that the present scheme will help to clear up many of them. Investigators are particularly urged not to base their descriptions of Trombiculid larvae on a series of cotypes but rather to establish a holotype and paratypes. No uniform procedure for the adult mites has been followed in the past ; in fact, some of the older descriptions are not at all clear as to whether a nymph or an adult was described.

The authors believe that the scheme here outlined will suffice for the system of classification as it is now understood, but give a warning that modifications may be needed as knowledge advances.

[The paper should be known to all who work on this family of mites.]

H. S. Leeson

FUKUZUMI, S. & OBATA, Y. **A New Species of Trombiculid Mites from Vicinity of Yokohama in Japan.** *Kitasato Arch. Exper. Med.* 1951, Jan., v. 23, No. 3, 79-81, 1 fig.

This is a description of a larval mite found on *Apodemus speciosus speciosus* ; it is named *Trombicula kitasatoi*. Important morphological details are illustrated and a table of standard measurements is given. Related species are *Trombicula intermedia*, *T. palpalis* and *T. pallida*.

H. S. Leeson

FUKUZUMI, S. & OBATA, Y. **A New Species of Trombiculid Mites from Kanagawa Prefecture in Japan.** *Kitasato Arch. Exper. Med.* 1951, Mar., v. 23, No. 4, 5-9, 3 figs.

ARMSTRONG, G., BRADBURY, F. R. & STANDEN, H. **The Penetration of the Insect Cuticle by Isomers of Benzene Hexachloride.** *Ann. Applied Biol.* 1951, Sept., v. 38, No. 3, 555-66, 1 fig.

DRESDEN and KRIJGSMAN [this *Bulletin*, 1948, v. 45, 653] showed that, when the various isomers of benzene hexachloride (BHC) were injected into the body of a cockroach, only the *gamma* form was toxic. They therefore concluded that the greater toxicity of this isomer was not due to a more rapid penetration, but due to some stereo-toxic effect. In this paper, however, the authors show that there are large differences in pick-up and penetration of the α , β , γ , and δ isomers of BHC by grain weevils exposed to dry films of them. The weevils (*Calandra granaria*) were exposed for varying periods to the films and then analysed in batches by washing and extraction followed by micro-colorimetric estimation of (i) superficial and (ii) internal BHC. The results showed that the isomers α and β were taken up in small amounts only (5-10 μ gm. per gramme of insect) and correspondingly small quantities penetrated inside.

The isomers γ and δ were taken up more readily (up to 60 and 100 $\mu\text{gm.}/\text{gm.}$ respectively in 12 hours). The authors point out that the rates of pick-up are in proportion to the solubility of the isomers in paraffinic hydrocarbons; and they suggest that this indicates that the first stage of penetration is a simple solution in the insect's waxy epicuticle. The penetration into the interior of the insects is much more rapid with the γ isomer than with δ (i.e., not in proportion to superficial concentration). It is suggested that the toxic action of the γ isomer somehow alters the interior cuticle and permits more rapid penetration.

J. R. Busvine

GRANETT, P., CONNOLA, D. P. & LEMBACH, J. V. **Laboratory Tests of Allethrin for Stability, Residual Action and Toxicity.** *J. Econom. Entom.* 1951, Aug., v. 44, No. 4, 552-7.

Tests are described to investigate the properties of allethrin, the completely synthetic allyl homologue of cinerin I. Comparative tests with the use of third instar larvae of *Aedes aegypti* showed allethrin to be half to one-third as toxic as pyrethrins (LD50, 0.19 p.p.m. and 0.059 p.p.m.). Similar tests in which 5 parts of either "Sulfox-cide" or piperonyl butoxide were added to 1 part of each chemical slightly enhanced the toxicity of both. Tests were conducted to show the relative stability of allethrin and pyrethrin aqueous emulsions when exposed to ultra-violet light with the use of a mercury lamp for 5 hours; to heat by storage in an oven at 110°-120°F. for 3 days; and to room conditions of 70°-85°F. and window light for 1 week: mosquito larvae were used as above. Allethrin was half as toxic as pyrethrins when fresh, but after exposure to light, heat and room conditions it was 1.2, 3 and 1.3 times as toxic respectively. When 5-day-old flies were sprayed with 0.1 per cent. kerosene oil solutions treated as above, allethrin was found to be generally slightly more effective. In residual tests to house-flies in which solutions in acetone and aqueous emulsions of both allethrin and pyrethrins were applied to wooden panels at 144 mgm./sq. ft., allethrin retained maximum toxicity for 3 months in both forms, while pyrethrin solutions gave only 50 per cent. kill after 1 week. Similar tests on glass panels showed that emulsions were more stable than deposits from acetone solution. Allethrin solutions gave 100 per cent. kill after 1 month and emulsions after 3 months. Pyrethrin emulsion retained its effect after 1 month but the solution was ineffective after only 1 week. Deposits from acetone solution of both allethrin and pyrethrins at 72 mgm./sq. ft. with the synergist "Sulfox-cide" at 360 mgm./sq. ft. remained fully toxic for 3 months, while similar deposits of 28 mgm. allethrin or pyrethrins with ten times this quantity of piperonyl butoxide gave almost 100 per cent. kill after 2 months in both cases. Tests carried out on painted wood surfaces showed that allethrin residues were less durable than on unpainted surfaces and that choice of emulsifier affected the result, alkylated sulphate being the best tried. Plywood panels treated with both substances at 144 and 72 mgm./sq. ft., half of each panel being exposed to ultra-violet light for periods of 4-30 hours, showed pyrethrins to be ineffective after the initial test, whereas 30 hours was necessary to reduce the effectiveness of allethrin. Settling mist tests, with the use of oil solutions against American and German cockroaches, showed that allethrin was 0.25 per cent. as effective as pyrethrins to the former and 0.7-0.9 times to the latter.

Ruth Nash

GINSBURG, J. M. **Toxicity of Allethrin to Mosquitoes, as compared with Pyrethrins.** *Mosquito News.* 1951, June, v. 11, No. 2, 99-102. [11 refs.]

Tests are described, with the use of different stages of *Aedes aegypti*, to compare the toxicity of allethrin with pyrethrins and to show the effect of synergists

on the former. Colloidal dispersions containing different quantities of toxicant in 1 ml. of acetone and 100 ml. water showed pyrethrins to be 2.5 and 4 times as toxic as allethrin to older larvae and pupae respectively [LD50 being 0.033 p.p.m. and 0.083 p.p.m. for larvae and 0.05 p.p.m. and 0.02 p.p.m. for pupae]. In similar tests with oil-in-water emulsions containing 66 per cent. kerosene and 0.5 per cent. lauryl sulphate, 0.134 per cent. of allethrin and half this percentage of pyrethrins were required to kill all the larvae. The kill of emerging adults by doses sublethal to pupae showed allethrin to be nearly as toxic as pyrethrins, kills being 70 per cent. and 87 per cent. respectively. The three synergists, piperonyl butoxide, N-propyl isome and " Sulfox-cide", when added at a 5 : 1 ratio to larvicides did not increase the kill of 0.0165 per cent. allethrin but slightly improved the effect of 0.033 per cent. All results show allethrin to be less effective than pyrethrins against *Aedes aegypti*.

Ruth Nash

McINTOSH, A. H. **Particle Size of Insecticidal Suspensions and their Contact Toxicity. III. Temperature Coefficients and Tests by Injection.** *Ann. Applied Biol.* 1951, Sept., v. 38, No. 3, 567-76, 4 figs. [11 refs.]

CHEN, Tien-chih & SUMERFORD, W. T. **The Synthesis of some Simple and Mixed Ethers as Contact Insecticides.** *J. Amer. Chem. Soc.* 1951, Oct., v. 73, No. 10, 4694-6.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

EAST AFRICA HIGH COMMISSION. **East Africa Medical Survey. Departmental Annual Report No. 2, 1950.** 41 pp. Nairobi.

"The intention is that the work of the Survey should consist of two phases : in phase I attempts will be made to obtain exact information on the state of health of selected populations : in phase II experiments will be made to ascertain the best methods of controlling the more important diseases.

In the choosing of areas suitable for surveying it is to be kept in mind :

1. As far as possible the populations chosen should be representative of the peoples of East Africa.
2. The people should be amenable.
3. Population density must be high.
4. The population should be isolated, with little flux of population."

To meet the above requirements the Medical Survey headquarters has been placed at the south end of Lake Victoria within easy reach of populations of suitable size which are isolated by tsetse-fly bush or by water.

Severe limitation of the amount of work done is due to the project being short of three-quarters of its intended staff ; it is expected that the building of living accommodation and laboratories at the headquarters at Mwanza, Lake Victoria (2°S., 33°E.) will be completed in 1951.

The first section of the report deals with the results of laboratory investigations on 500 hospital admissions, blood films, haemoglobin levels, urines, stools and sputa ; this limitation of laboratory work was due to incomplete equipment and staff. Of 542 thick blood films examined 12.3 per cent. were positive for microfilariae, 5 per cent. for malaria parasites, 2 per cent. for *Trep. duttoni* and 0.4 per cent. for *Trypanosoma rhodesiense*. Percentage haemoglobin levels for 439 people are tabulated in age-groups. They range from 4.3 to 18.0 grammes haemoglobin per cent. ; a complicating factor is the 4,000 feet altitude at Mwanza.

A field survey of urinary schistosomiasis in one area, results of which are tabulated according to age and sex, indicates the presence of *S. haematobium*

eggs in 35 per cent. of 179 males and 29 per cent. of 121 females. Stools were examined for helminth eggs by concentration technique but the wide variations in day-to-day egg output make it certain that the number found positive are much below the true incidence of intestinal parasitism. In 598 stools examined the following positive percentages were found :—*S. mansoni* 4.5, *Ascaris* 1.8, *Taenia* 1.7, hookworm 43.0, amoebic cyst 0.25. Statistical analyses show no relationship between hookworm load and haemoglobin level in the series examined. The significance of hookworm infestation in relation to health is to be investigated further.

The second section of the report is a description by Dr. H. TRANT of two months of field survey on Ukara island in Lake Victoria, which is some 30 square miles in area and supports 16,000 people. This isolated population is to be fully investigated. Her initial impressions are summarized as follows :—

Food : barely sufficient in quantity and lacking in quality particularly for females because of taboos on several important sources of protein.

Filariasis : 26.3 per cent. of the population show larvae of *W. bancrofti* in the blood stream and 1 per cent. of the population suffer from bancroftian elephantiasis.

Leprosy : nearly 2 per cent. of the population are estimated to have leprosy : attempts at segregation have now begun.

Schistosomiasis : patchy in distribution throughout the island, *S. mansoni* being the more important with patches of 30 per cent. incidence.

Ascariasis and hookworm are both common, the incidence of ascariasis being much higher than on the neighbouring mainland.

Venereal diseases and hypovitaminoses are both present but there is no exact information available on incidences.

[The dozen pages of the original narrative are well worth reading.]

The third section gives detail of mosquito distribution on Ukara following a brief visit. The fourth section deals with vital statistics about which very little reliable information exists in the tropics.

The maternity histories of 1,817 Sukumaland women were analysed and compared with the 712 histories obtained previously. In addition an analysis was made of maternity data of 3,483 women from the Nzega Clinic. The total fertility rate lies between 5.0 and 5.5 ; since 50.3 per cent. of the live births reported were female, the gross reproduction rate probably lies between 2.5 and 2.75. The infant mortality rate for children born to younger women is of the order of 20 per cent. in the rather small group investigated. The net reproduction rate is about 1.3 to 1.7 implying a rate of natural increase of 1 to 2 per cent. per year. Death rates in the higher age-groups cannot be given with any accuracy.

[This annual report indicates the potential of valuable basic information which may accrue when the early difficulties of recruitment of staff and shortage of accommodation are successfully overcome.]

R. Ford Tredre

MADRAS. Report on the Health Conditions in Madras State 1949

[SUBRAMANIAM, R., Director of Public Health]. pp. iv+174+6, 18 charts & maps. 1951. Madras : Govt. Press. [3 rupees 6 annas.]

One-sixth of a total population of 53,436,000 in Madras State is estimated to live in towns ; Madras City population is 998,000. The overall density exceeds 400 per square mile. The birth rate is 32.3 ; death rate is 17.4 ; infant mortality rate 119.8 ; maternal mortality rate 5.8.

Cholera mortality (13,422 deaths) was half that of 1948 ; the Cauvery delta is an endemic focus, so that the Cauvery basin contributed half the total deaths ; 4,600,000 inoculations were performed in the year. Contributory

causes additional to insanitary conditions were failure of the monsoon and associated water scarcity and large-scale migration in search of food and work. The Cauvery delta has been selected by the World Health Organization as the venue for a demonstration of the eradication of endemic foci of cholera ; an Indian Council of Medical Research team had already commenced work in selected villages.

In contrast with the explosive and dramatic character of cholera, the quietly spreading amoebic dysentery and small localized outbreaks of bacillary dysentery go unnoticed and uncontrolled. The average death rate from this group over 5 years was 1.44 per 1,000 of the population, with 55,521 deaths in 1949. No definite reduction in the prevalence of bowel infections will occur until substantial progress is made in the provision of costly water-supplies and self-cleansing attractive household latrines.

Despite compulsory vaccination smallpox continues to be endemic, with 20,763 cases and 5,918 deaths. Control is possible only by successful primary vaccination in the first year of life followed by re-vaccination every five years.

The Indian Council of Medical Research team completed their researches on plague in the Nilgiris and reported that DDT is extremely effective as a pulicide with a persistence of residual action for 16 months after a single application. Only 150 deaths from plague were reported in the year.

The malaria organizations, by the use of DDT residual spraying (5 per cent. emulsion), have caused a marked reduction in rural malaria to the extent that unfrequented and unexploited malarious lands have been brought under the plough. Brief notes describe the results attained in each of 25 district schemes, involving the vectors *A. fluviatilis*, *A. culicifacies* and *A. sundanicus*.

Accurate figures for the incidence of and mortality from tuberculosis are not available. Ten tuberculosis clinics exist and about 2,000 beds are available throughout the State. Considerable expansion is necessary. A BCG campaign has been inaugurated in Madras by W.H.O., and local teams are in process of action and training ; to date about 23 per cent. of those tested require vaccination.

Infective cases of leprosy in the State are estimated at 25,000 and there are 17 institutions with a bed strength of 3,225. The Central Government is to implement a unified programme and " the future is therefore bright ".

Thirty Primary Health Centres have been established, each with a staff of one Health Inspector, one peon and one midwife working under a medical officer. " There has been great difficulty in finding technical personnel and in getting the villagers to provide the much-needed amenities for the work. Although appreciable work has been done where sufficient enthusiasm was forthcoming among staff as well as the public, it cannot be claimed that the centres have been set on a proper footing."

Altogether, 106 pages of this 174-page report are devoted to tables of figures, graphs of annual mortality rates for the principal causes of deaths, graphs showing a comparison of trends in the mortality rates for the 22-year periods before and after 1923 of cholera, smallpox and plague, and maps illustrating district mortality in these diseases.

[The above notes are a mere extract of points of special importance and give some indication of the enormity of the public health problems.]

R. Ford Tredre

MALAYA, FEDERATION OF : Annual Report of the Institute for Medical Research for the Year 1949 [FIELD, J. W., Director]. pp. vi+103, 7 figs. 1950. Kuala Lumpur : Govt. Press. [\$2 or 4s. 8d.]

This Institute is a branch of the Malayan Medical Service with routine responsibility for the manufacture of vaccines and the laboratory diagnosis of

diseases ; the other half of its resources is devoted to research and to that end it has its divisions of Bacteriology, Biochemistry, Entomology, Malariology, Nutrition and Pathology. The Institute has recovered from the effects of war and enemy occupation, the evidence of which lies in the very considerable volume of work described for 1949. Forty-four papers are listed as published in various journals in the same year, and an additional 8 in American journals by members of the United States Army Medical Research Teams based at the Institute, dealing with the then new antibiotic chloramphenicol.

An interim report by SMADEL on the chemoprophylactic value of chloramphenicol describes the "amazingly successful" results against the local rickettsial infection, scrub typhus, for which typical charts are reproduced. Working on the same disease is the Colonial Office Scrub Typhus Research Unit under AUDY ; its function is the long-term study of the natural history of scrub typhus by investigation of the biology and ecology of carrier mites and their annual hosts, of which rats are the most important.

The Divisions of Entomology and Malariology report the results of field experiments into the usage of DDT and BHC and various anti-malarial drugs as malaria control measures. Anaemia is responsible for much morbidity in Malaya and little work has been done on the problem ; the Director of the Division of Nutrition, Dr. R. C. BURGESS, has this fact in mind when dietary surveys and concomitant medical examinations are in progress : "a large bulk of rice and one or more spiced side dishes" is hardly a balanced diet, particularly if the rice is highly milled. The Division of Biochemistry records its research into thiamine content of rice and the effect of washing and cooking and parboiling ; a "premix" plant has been set up in Singapore, the product being on sale to the public to be added to rice before cooking. In addition to nicotinic acid and iron the premix contains 200 mgm. of riboflavin and 400 mgm. of thiamine per lb.

The Division of Bacteriology reports in some detail the success of chloramphenicol in the treatment of typhoid fever, influenzal meningitis and pyelitis due to *Streptococcus faecalis* and failure in cases of tuberculosis of the kidney, bacterial endocarditis and undulant fever (*Br. abortus*) ; a list of Malayan strains of bacteria affected *in vitro* by this drug is recorded.

These notes are but a brief indication of the valuable work in progress at this well-known Institute ; the bibliography of published work makes the report additionally useful for reference.

R. Ford Tredre

REED, J. G. **Health on some Perak Estates.** *Med. J. Malaya.* 1951, June, v. 5, No. 4, 329-66.

"The object of this paper is to present a sketch of the population trends, vital statistics, and health of the South Indian labourers and their dependents living on the estates of a district of Perak, for the first five years after the Japanese Occupation of Malaya, and to draw some comparison with the period leading up to that event." Chinese, Malays and Javanese also worked on estates but, because of ebb and flow of these groups, statistics have not been kept. The statistical information is based therefore on approximately 5,000 working people with, in addition, three dependents per five workers. Possibly because of the present emergency there has been a moderate but continuous drift of Indian labour from the district since 1947 ; however, it appears to be diminishing. The tables of live births, still-births, abortions and infant mortality indicate an average birth rate of 58.5, with 9.4 per cent. of pregnancies ending in still-birth or abortion ; of the live births there is a neonatal mortality rate of 49 and an infant mortality rate of 93. In 1939 the birth rate was 38.1 and its peak in the post-war years was 65.1. The index of fertility

rose in like manner from 188 to 275. The phenomenon of a high proportion of male births after war or pestilence was evident over this period.

Hospital admissions indicate the predominance of respiratory and gastro-intestinal diseases of children, and an increase in infectious disease, *e.g.*, measles, pneumonia, chickenpox, whooping cough, typhoid fever and amoebic dysentery; post-war the incidence of malaria has been low. Attention is drawn to the necessity for an "integrated tuberculosis service". An average annual death rate of 11.8 results from the following causes in order of importance: prematurity, gastro-enteritis, malaria, pneumonia, convulsions, pulmonary tuberculosis and violence. The questions of anaemia and nutritional defects underlying a maternal mortality rate of 10.8 are discussed. Similarly the infant mortality rate draws attention to "the influence of the rice factor" in diet, in that parboiled rice is not regularly or generally available; other causes are fully discussed.

The general low incidence of malaria is certainly not due to improved control. Reliance is placed on mass suppressive treatment with proguanil. The author is not favourably impressed with this method as a sole measure and writes: "the main indications for its use at present are for small populations where larva control is impossible or completely uneconomic, and as an initial weapon in the presence of epidemic malaria while other methods are being considered and initiated. Mepacrine is still used in the district for the routine treatment of the individual case of malaria." An increase in malaria must be expected and planned for; the use of residual insecticides is still in the experimental stage and "at present it seems unlikely that it will provide more than an auxiliary weapon". [This is a surprising statement at so early a stage in trials which lag behind similar work in other countries.]

The problem of nutrition and related anaemia indicated by the frequent occurrence of signs of lack of protein, vitamins and minerals is discussed; "excessive nutritional ill-health" sums up the situation, the root cause of which is not wholly economic but associated with food habits. The author believes that supplementary dieting or communal feeding would make a great difference, *e.g.*, one properly balanced meal a day.

Detailed tables give comparative figures for 1939 and annually from 1946 to 1950 for this district; separate tables compare these figures with those for the Malayan Federation.

R. Ford Tredre

GORGAS MEMORIAL INSTITUTE. **Annual Report of the Gorgas Memorial Laboratory, 1950** [SILVER, J. F., President]. 36 pp., 1 map. 1951. Washington: Govt. Printing Office.

The subjects studied during 1950 include jungle yellow fever, Chagas's disease, malaria, tuberculosis and the newly noted occurrences of Rocky Mountain Spotted Fever in the Panama territory; the laboratory has become one of the main centres in the Western Hemisphere for the study of *Phlebotomus*, some 50 species being known now in Panama.

The survey of arboreal forest animals to determine the wild animal reservoir of jungle yellow fever in the Panama area was continued; the results of the mouse-protection tests are tabulated. Of 201 and 224 animals from East and West Panama respectively 51.7 and 30.3 per cent. were positive; the majority were monkeys of various species but the occasional kinkajou, sloth, ocelot and opossum were also positive. 4,395 mosquitoes were all negative to the attempted isolation of yellow fever virus.

In the course of routine work two cases of suspected yellow fever in local Panamanians proved to be infections by strains of *Rickettsia rickettsi* [see this *Bulletin*, 1951, v. 48, 28].

GALINDO and TRAPIDO continued their observations on forest mosquitoes : a five-page summary of their findings is included in this report ; no precise conclusion as to the vector of sylvan yellow fever was established, but *Haemagogus equinus* and *H. lucifer* were most abundant generally and at the catching stations nearest the area where fatal human cases occurred [GALINDO, CARPENTER and TRAPIDO, *ibid.*, 1951, v. 48, 802].

HERTIG and FAIRCHILD continue the study of the taxonomy of *Phlebotomus* in the Western hemisphere, a study fundamental to the epidemiology of leishmaniasis, bartonellosis or other diseases associated with this fly. A new and valuable taxonomic character, the second sternite, has been discovered and evaluated.

Some extension of the BCG vaccination service has been achieved, some 13,800 persons having been vaccinated in one year, 1949-50 ; post-vaccinal allergy was positive in 5,571 of 5,689 individuals tested. Tuberculin tests in 1950 of 279 persons vaccinated the previous year, 1948-49, revealed 192 positive, 56 negative and 31 doubtful results. No complications caused by vaccination have been observed so far.

Malaria control continues to be practised by a combination of DDT house applications and drug treatment ; the bi-monthly parasite rate in the Chagres River area averages 1.06 compared to 2.21 and 1.07 in the control areas. The voluntary use of mass treatment with aralen [chloroquine] and paludrine [proguanil] is in process of trial in three Gatun Lake villages. Before the introduction of these drugs malaria rates were 26.5 and 34.8 per cent. ; at the end of one years' voluntary use of aralen and paludrine respectively the rates were 2.2 and 4 per cent. Villagers preferred aralen. It follows that rural regions can be kept under good malaria control by the use of these drugs as suppressive treatment without any other anti-malarial weapon.

The report concludes with a tabulated snake census of Panama.

R. Ford Tredre

BOLIVIA : MINISTERIO DE HIGIENE Y SALUBRIDAD. División de Endemias Rurales. Organismo mantenido por cooperacion entre el Gobierno de Bolivia y la Division Sanitaria Internacional de la Fundacion Rockefeller. Informe Anual 1950. 19 pp., 5 maps. La Paz-Bolivia. [Annual Report for 1950 of the Organization for Co-operation between the Bolivian Government and the International Sanitary Division of the Rockefeller Foundation]

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